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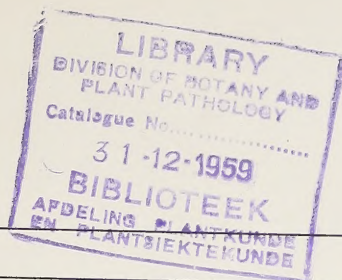
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THE JOURNAL OF SOUTH AFRICAN BOTANY.

VOLUME XVI, 1950.

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JOURNAL
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VOL. XVI.

SOME TRANSFERS IN THE GENUS HAWORTHIA.

By G. G. SMITH.

Haworthia incurvula Poelln. in Fed. Rep. XXXI (1932) 85; J. R. Brown in Des. Pl. Life VIII (1936) 45, cum fig.; Poelln. in Fed. Rep. XLI (1937) 203, XLIV (1938) 233.

When Von Poellnitz published this species, he wrote: "I am not quite clear on the placing of this striking, elegant little species—at best it perhaps belongs in the Sect. *Muticæ*." The character of the plant and of the inflorescence is such that it cannot correctly be placed in this section. At the type locality, near the top of the slopes of a very deep valley, this plant is hardly variable, but as one descends, the plant changes and at a point in the valley about a mile from the type locality they are in appearance approaching *H. cymbiformis* (Haw.) Duv., or at least these plants definitely belong in the Sect. *Obtusatae* Berger. It is interesting to note that Pole-Evans in Fl. Pl. S. Afr. IX (1929) pl. 356, erroneously figured *H. incurvula* under the name *H. cymbiformis* v. *planifolia* (Haw.) Bak., (now *H. planifolia* Haw.). I have no hesitation in removing *H. incurvula* from the Sect. *Muticæ* and placing it in the Sect. *Obtusatae* Berger.

H. lisbonensis Resende et Pinto-Lopes in Port. Acta Biol. II (1946) 175.

This plant was placed by Resende in the Sect. *Coarctatae*, but as it does not belong in this Section I am transferring it to the Sect. *Rigidæ*. There is no doubt about this plant being a garden hybrid, in spite of Resende in Port. Acta Biol. II (1946), 175: "This species—which may be termed a *good species* within the Sect. *Coarctatae*, as it does not present forms of transition to any other species and has $2n=14$ (Pinto-Lopes, 1944)", etc. It is sometimes difficult to decide in which Section a hybrid belongs. *H. perplexa* Poelln. is a field hybrid between *H. cymbiformis* in the Sect. *Obtusatae* and *H. angustifolia* in the Sect. *Loratae*, yet it is best placed in the Sect. *Planifoliae* Berger.

H. agavoides Zant. et Poelln. in Fed. Rep. XLIII (1938), 232.

The relationship between *H. agavoides* Zant. et Poelln. and *H. sordida* Haw. is a very close one. Both plants are quite similar in colour and habit, but the leaves of the former are distinctly tubercled, while those of the latter are tuberculate-rugose. *H. agavoides* does not merit more than varietal rank and I therefore make the following transfer:—

H. sordida v. agavoides (Zant. et Poelln.) G. G. Smith.

There is no record of the type locality, but this variety occurs near Maraishope and Kleinpoort in the Uitenhage Dist. *H. sordida* occurs near Addo in the Uitenhage Dist., and near Springbokvlakte in the Steytlerville Dist.

SOME NEW SPECIES AND VARIETIES IN THE GENUS HAWORTHIA. VII.

(With Plate I—II.)

By G. G. SMITH.

When Marloth published *H. limifolia*, Trans. Roy. Soc. S. Afr. I (1908) 409, he stated: "the leaves are not tubercled but have numerous raised undulated transverse lines". A close study of this plant reveals the fact that the lines referred to are more like raised lines than tubercles, but on the same plant one finds distinctly confluent as well as solitary tubercles. He further states: "the surface-markings of the leaves are quite different from those of any other species, and might be sufficient to constitute a new section, viz., *Limifoliae* (*Limifolia* per err.) on account of the similarity of the surface to that of a coarse file."

Characteristic of *H. limifolia* Marl. is its stoloniferous habit of producing young plants, a habit found only in the Sect. *Tessellatae* (Salm) Bak. and *Trifariae* Haw. and to a very small degree in a few species in the Sect. *Coarctatae*, but definitely not in any other species in the Sect. *Margaritiferae*, in which Marloth placed his species.

Two recently discovered Haworthias from the Swaziland area (probably the type locality for *H. limifolia*, i.e. west of Delagoa Bay) have the same stoloniferous habit and general appearance of *H. limifolia*, but the tubercles on the one are less prominent, while on the other they are still less prominent and are in this case longitudinally arranged. The first plant referred to I propose naming *H. limifolia* v. *keithii*; the second one is *H. ubomboensis* Verdoorn, which I propose reducing to a variety, i.e. *H. limifolia* v. *ubomboensis* (Verdoorn) G. G. Smith, and removing it from the Sect. *Margaritiferae*. I place these three plants (1 species and 2 varieties) in a new Sect. *Limifoliae* G. G. Smith, based on *H. limifolia* Marl.

Sect. **Limifoliae** G. G. Smith, Sect. Nov.

Plantae stoloniferae.

Folia spiraliter disposita rosula acauli, aliquantum firma, ovato-lanceolata acuminata vel acuta, cuspidata, concolora, tuberculis confluentibus necnon solitariis prominentibus concoloribus vel pallidioribus induta.

Pedunculus simplex; *racemus* floris gemmisque spiraliter dispositis; *perianthium* basi cylindrico-sexangulum.

Plants stoloniferous.

Leaves spirally arranged in a stemless rosette, somewhat firm, concolorous, beset with transversely or longitudinally arranged confluent and solitary raised concolorous or lighter coloured tubercles, ovate-lanceolate, acuminate, cuspidate.

Peduncle simple; *raceme* with spirally arranged flowers and buds; *perianth* with cylindrical-hexagonal base.

H. limifolia Mar. Trans. Roy. Soc. S. Afr. I (1908) 409.

H. limifolia v. *ubomboensis* (Verdoorn) G. G. Smith, comb. nov.

H. ubomboensis Verdoorn in Fl. P. S. Afr. XXI (1941) pl. 818.

H. limifolia v. *keithii* G. G. Smith. (Description follows.)

Haworthia limifolia* v. *keithii G. G. Smith. (Liliaceae-Aloineae.)
Sect. Limifoliae.

Foliorum rosula acaulescens, fere 11 cm. diam.

Folia circa 18, fere 7 cm. longa, basin versus 18 mm. lata, lanceolata acuminata falcata; *supra* concava tuberculata, fere 8 lineis; *infra* lineis numerosis induta.

Pedunculus simplex, $1\frac{1}{2}$ mm. diam., racemo incluso 25 cm. longus; *pedicelli* $5\frac{1}{2}$ mm. longi, $\frac{3}{4}$ mm. diam.; *perianthium* 13 mm. longum.

Rosette acaulescent, about 11 cm. diam., stoloniferous.

Leaves about 18, the young \pm erect and slightly incurved, the old spreading recurved, \pm firm, about 7 cm. long, up to 18 mm. broad at the base, 5 mm. thick at middle, lanceolate, acuminate, falcate; *face* concave, pink at base, light green above, becoming darker towards the tip, with about 8 dark reddish longitudinal anastomosing lines visible only towards the base of leaf. in the middle-half beset with raised confluent and fewer solitary concolorous shining tubercles in undulated transverse rows and becoming \pm 4-furrowed below, with 1—2 raised longitudinal lines on which are solitary and oblong longitudinally arranged concolorous tubercles, the lines not reaching the tip; *back* convex, pinkish-brown at base, light olive green above, in the upper $\frac{3}{4}$ with tubercles similar to those on the face but paler and more crowded, also in transverse undulated rows, with many anastomosing longitudinal reddish lines visible in the lower $\frac{1}{3}$; *keel* obliquely arranged in the upper $\frac{3}{4}$; *margins* \pm acute, concolorous.

Peduncle simple, terete, $1\frac{1}{2}$ mm. diam., 25 cm. long including the raceme, light greenish-brown below; *raceme* $11\frac{1}{2}$ cm. long, about 18 spirally arranged flowers and buds, 1(—2) open at a time; *pedicels* $5\frac{1}{2}$ mm. long, $\frac{3}{4}$ mm. diam., erect, brown; *sterile bracts* 4, about 5 mm. long, the lowest $2\frac{1}{2}$ cm. from base of peduncle; *fertile bracts* $3\frac{1}{2}$ mm. long, broadly lanceo-

late, acuminate, light brown with a very broad dark brown nerve; *perianth* pinkish-white, 13 mm. long, the cylindrical-hexagonal base $3\frac{1}{2}$ mm. across, constricted to 3 mm. above, not stipitate, ascending, curved; 3 *inner segments* obtuse, nerve colour brown at tip, greenish-brown below, broad, the upper one channelled, face pink at tip, greenish below, recurved about

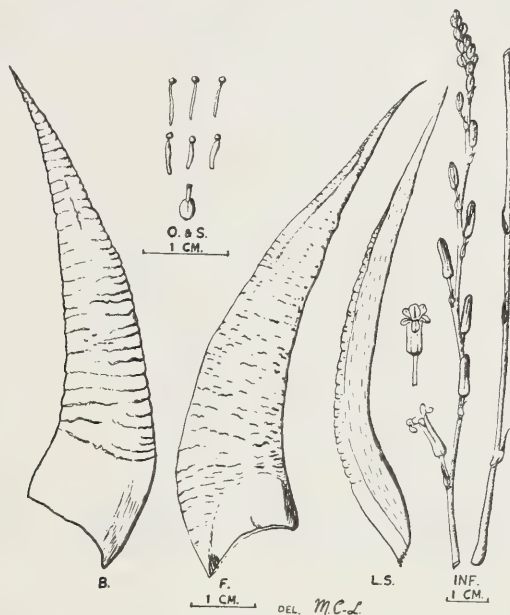


FIG. 1. *H. limifolia* var. *Keithii*.

45 degrees, the two lower segments \pm replicate, face colour pinkish-white at tip, green below, recurved about 90 degrees, very spreading; 3 *outer segments* obtuse, channelled, face colour of the two upper pink with a fine greenish-brown nerve, recurved about 90 degrees, face colour of the

KEY TO THE DRAWINGS.

- | | |
|----------------------------|---|
| F — Leaf face. | B — Leaf back. |
| LS — Longitudinal Section. | SM — Section near middle. |
| SB — Section near base. | ST — Section near tip. |
| INF — Inflorescence. | Del. M.C.L. — Drawn by Miss M. Courtenay- |
| O & S — Ovary and stamens. | Latimer. |
| C — Capsule. | |

lower segment pink at tip, pinkish-white below, with a broad greenish-brown nerve, recurved more than 90 degrees; *stamens* 4 and 5 mm. long; *ovary* $2\frac{1}{2}$ mm. long, $1\frac{3}{4}$ mm. diam., green; *style* 2 mm. long, greenish-yellow, with a white capitate tip, straight.

Habitat: Swaziland. (Type G. G. Smith 5693, in the East London Museum Herbarium.)

Distribution: Not further known.

This interesting variety was sent to the author by Capt. D. R. Keith of Stegi, Swaziland, in April 1944. It occurs amongst rocks on the Ubombo Range, at an altitude of about 2,000 feet. It differs from the species by its lighter colour, less rigid and narrower leaves and less prominent tubercles, but is similar in its stoloniferous habit, arrangement of back and face tubercles and the longitudinal lines on the face.

The discovery of this new variety introduces a plant which in both habit and appearance is midway between *H. limifolia* Marl. and *H. limifolia* v. *ubomboensis* (Verdoorn) G. G. Smith. The latter plant is, however, lighter green than *H. limifolia* v. *keithii*, G. G. Smith, and has no transverse tubercles but the tubercled longitudinal face lines and the stoloniferous habits are similar in both plants.

Haworthia nortieri var. **montana** G. G. Smith. (Liliaceae-Aloineae.)
Sect. Denticulatae.

Foliorum rosula acaulescens, fere 5 cm. diam.

Folia circa 40, fere 35 mm. longa, 9 mm. lata, obovato-oblonga acuminato-acuta; *supra* convexa levia, in dimidio superiore maculis oblongis pellucidis solitariis necnon confluentibus inaequaliter ornata; *marginēs* et *carina* dentibus parvis pellucidis indutae; *arista terminalis* 9 mm. longa, denticulata.

Pedunculus simplex teres, fere 2 mm. diam., racemo incluso fere $18\frac{1}{2}$ cm. longus; *pedicelli* 4 mm. longi; *perianthium* 17 mm. longum.

Rosette acaulescent, about 5 cm. diam., proliferous from the base and forming small clusters.

Leaves about 40, the young erect, incurved, the old ascending, incurved, \pm firm, about 35 mm. long, 9 mm. broad about the middle, $4\frac{1}{2}$ mm. thick above the middle, obovate-oblong, acuminate-acute; *face* flat-concave below, convex above, smooth, irregularly pellucid in the upper half in solitary and confluent longitudinally oblong pellucid markings in longitudinal rows, with 3—4 green reticulate lines, the middle one reaching the tip, the others meeting the middle line below the tip, the pellucid markings situated between the lines and between the outer lines and the margins, on some leaves they are raised and sometimes bear teeth, pale green below becoming dark greyish-green above, dull; *back*

convex, smooth and in the upper half with similar pellucid markings between the 4—6 indistinct reticulate lines to those on the face, dull green below becoming dark brownish-greyish-green above, dull; *margins* acute and narrow-pellucid below, rounded and broadly pellucid in the upper half, with about $\frac{3}{4}$ mm. long straight pellucid teeth about the middle of the leaf, becoming smaller towards the tip and minute towards the base, the teeth much broadened at their base; *keel(s)* 1(—2) in the upper half, the second one when present usually towards the margin, from about the middle of the leaf to below the tip beset with teeth similar to those on the margin but smaller; *end-awn* 9 mm. long, white, persistent, denticulate.

Peduncle simple, terete, nearly 2 mm. diam. and dark brown below, including the sub-laxly 14-flowered raceme about $18\frac{1}{2}$ cm. long, the flowers and buds spirally arranged; *raceme* $4\frac{1}{2}$ cm. long, 2—3 flowers open simultaneously; *pedicels* 4 mm. long, $\frac{1}{2}$ — $\frac{3}{4}$ mm. diam., ascending, greyish-green; *sterile bracts* 18, 14 mm. long, the lowest about $1\frac{1}{4}$ cm. from base of peduncle; *fertile bracts* $4\frac{1}{2}$ mm. long, broadly lanceolate, acute, white with a very fine brown nerve; *perianth* white, hardly stipitate, 17 mm. long, the cylindrical-triangular base 4 mm. across, restricted to $3\frac{3}{4}$ mm. above, ovate, erect-spreading, curved; 3 *inner segments* obtuse, channelled, face colour white at tip, yellowish-brown below, the upper segment straight, its nerve dark green, medium fine, the 2 lower segments recurved 90 degrees, spreading, their nerves green, broad, the nerves in the three segments ending abruptly about 2 mm. from the tip of the segment; 3 *outer segments* obtuse, channelled, face colour white with a greenish-brown fine nerve, the two upper segments recurved about 90 degrees, hardly spreading, the lower segment much more recurved; *stamens* $4\frac{1}{2}$ and 4 mm. long; *ovary* 3 mm. long, fully 1 mm. diam., green; *style* 1 mm. long, greenish-white, bent, \pm capitate.

Habitat: Cape Province; Clanwilliam Dist. (Type *G. G. Smith* 1678, in the East London Museum Herbarium.)

Distribution: Not further known.

This variety is described from material collected by the author in Jan. 1937, on Pakhuis Pass, where it grows often tightly wedged in rock crevices. It differs from the species by its shorter and narrower leaves, shorter end-awn, fewer face and back lines, smaller teeth on margins and keel, longer pedicel, more sterile bracts and the yellowish-green colour of the 3 inner perianth segments as against the golden yellow of *H. nortieri* G. G. Smith.

Haworthia nortieri* var. *giftbergensis G. G. Smith. (Liliaceae-Aloineae.)
Sect. Denticulatae.

Foliorum rosula acaulescens, fere 5 cm. diam.

Folia circa 45, fere 34 mm. longa, 7 mm. lata, oblongo-obovata acuminata; *supra* plano-convexa levia, maculis orbiculatis necnon oblongis pellucidis longitudinaliter striata; *infra* convexa levia, maculis solitariis necnon oblongis confluentibus longitudinaliter striata; *margines* et *carina* dentibus parvis albidis indutae; *arista* terminalis 8 mm. longa.

Pedunculus simplex teres, plene 1 mm. diam., racemo incluso 29 cm. longus; *pedicelli* $5\frac{1}{2}$ mm. longi; *perianthium* 16 mm. longum.

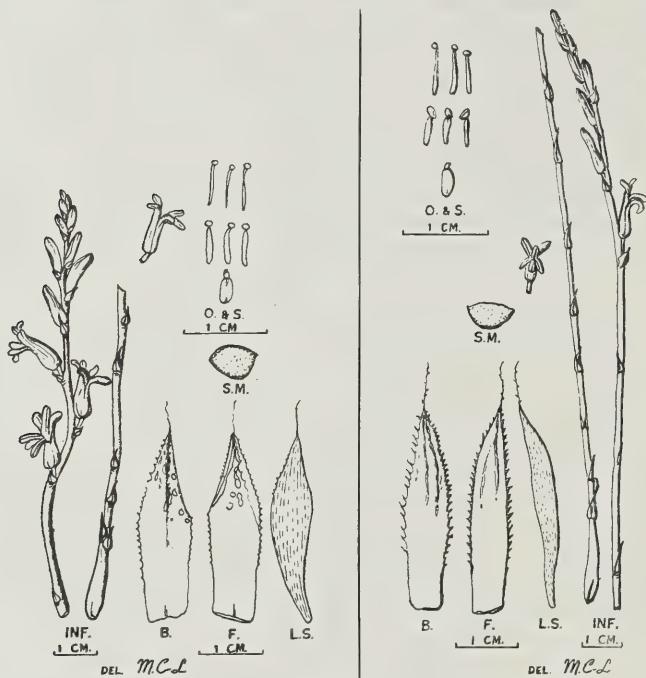


FIG. 2.

H. nortieri var. montana.

H. nortieri var. giftbergensis.

Rosette acaulescent, about 5 cm. diam., proliferous from the base and forming small clusters.

Leaves about 45, the young erect slightly incurved, the old ascending \pm recurved, \pm tender, about 34 mm. long, 7 mm. broad at the middle, 4 mm. thick above the middle, obovate-oblong, acuminate; *face* concave below, flat concave above, smooth, with round and longitudinally oblong pellucid markings in longitudinal rows, $5 \pm$ indistinct dark brown

reticulate lines which meet at or near the tip, dull light reddish-green below, dull reddish-brown above, with a glaucous sheen all over, not shining; *back* convex, smooth, with solitary and confluent longitudinally oblong pellucid markings, 5 dark brown reticulate lines, dull brownish light green below, dull brown above and with a glaucous sheen all over, not shining; *margins* acute below, rounded above, beset with white mostly straight teeth which are about 1 mm. long above middle of leaf and shorter below; *keel* 1(—2) in the upper $\frac{1}{3}$, obliquely arranged, the second keel when present near the margin, beset with white teeth smaller than those on the margin; *end-awn* 8 mm. long, white, persistent, denticulate.

Peduncle simple, terete, fully 1 mm. diam., 29 cm. long including the $6\frac{1}{2}$ cm. long raceme, about 12 spirally arranged flowers and buds, one open at a time, light greyish-brown near base of peduncle; *pedicels* $5\frac{1}{2}$ mm. long, $\frac{3}{4}$ mm. diam., erect, brownish-green; *sterile bracts* 11, 7 mm. long, the lowest 2 cm. from base of peduncle; *fertile bracts* 6 mm. long, deltoid, acuminate, white, with a broad dark brown nerve; *perianth* dull reddish-white, 16 mm. long, the cylindrical-triangular base $3\frac{1}{4}$ mm. across, tapering to $2\frac{1}{2}$ mm. above, oblong-ovate, erect, curved; 3 *inner segments* obtuse, channelled, face colour white at tip, canary yellow below, the upper one straight, with a broad brown nerve, the lower segments long recurved about 60 degrees, with a broad dark brown nerve; 3 *outer segments* obtuse, channelled, face colour white with a dark reddish-brown medium thin nerve, the 2 upper segments recurved about 90 degrees, the lower one recurved-revolute; *stamens* 6 and $4\frac{1}{2}$ mm. long; *ovary* 3 mm. long, $1\frac{1}{4}$ mm. diam., bright green; *style* $\frac{3}{4}$ mm. long, white, \pm bent, not or hardly capitate.

Habitat: Cape Province; Van Rhynsdorp Dist. (Type, G. G. Smith, 7199, in East London Museum Herbarium.)

Distribution: Not further known.

This variety collected by the author on the Giftberg Mts., near Van Rhynsdorp in Sept. 1948, differs from the species in its being smaller, with shorter and narrower leaves, shorter end-awn, fewer face and back lines, longer and thinner pedicels, more sterile bracts and longer perianth. Compared with the variety *montana* G. G. Smith the leaves are shorter and narrower, face and back lines more numerous, pedicels longer, fewer sterile bracts and shorter perianth. It is also distinguished by the face colour of the three inner perianth segments which is canary yellow, as against *H. nortieri* G. G. Smith which is golden yellow, and *H. nortieri* var. *montana* G. G. Smith which is yellowish-green. In cultivation, in part shade, the leaves become pale green below and darker above, and they lose the glaucous sheen.

Haworthia leightonii G. G. Smith. (Liliaceae-Aloineae.) Sect. Limpidae.

Foliorum rosula acaulescent, fere 7 mm. diam.

Folia circa 45, fere 43 mm. longa, in dimidio inferiore 16 mm. lata, oblonga acuta; *supra* plano-convexa, fere 5 lineis rubris; *infra* fere 11 lineis rubris ornata; *marginēs* et *carina* dentibus parvis pellucidis indutae; *arista* terminalis 5—6 mm. longa.

Pedunculus simplex, fere $1\frac{1}{4}$ mm. diam., racemo incluso 20 cm. longus; *pedicelli* 2 mm. longi; *perianthium* 16 mm. longum.

Rosette acaulescent, 7 cm. diam., freely proliferous from the base and axil of the lower leaves and forming large clusters.

Leaves about 45, the young erect, \pm incurved, the old ascending often recurved, tender, about 43 mm. long, the lower half about 16 mm. broad, 5 mm. thick near tip, oblong, acute (mostly acuminate when young); *face* concave below flat to \pm convex and \pm turgid near tip, the pellucid part about 8 mm. long, with about 5 red inconspicuously reticulate lines, one of which reaches the tip, the others becoming progressively shorter, light green below becoming dark red above, \pm shining; *back* convex, the pellucid part \pm longer than that of the face, with about 11 indistinctly reticulate red lines, the middle one and the second from margins meeting at the tip, the others progressively shorter, pale green below, becoming dark red above, \pm shining; *keel* 1, in the upper $\frac{1}{4}$ obtuse, usually central, with about $\frac{1}{2}$ mm. long subulate pellucid scattered teeth; *margins* acute from base of leaf to about the middle, rounded above, sometimes with 2 rows of teeth (hardly a second keel), these about $\frac{3}{4}$ mm. long, becoming minute below, pellucid and mostly deflexed; *end-awn* 5—6 mm. long, sparsely denticulate below, red at base, white above, persistent.

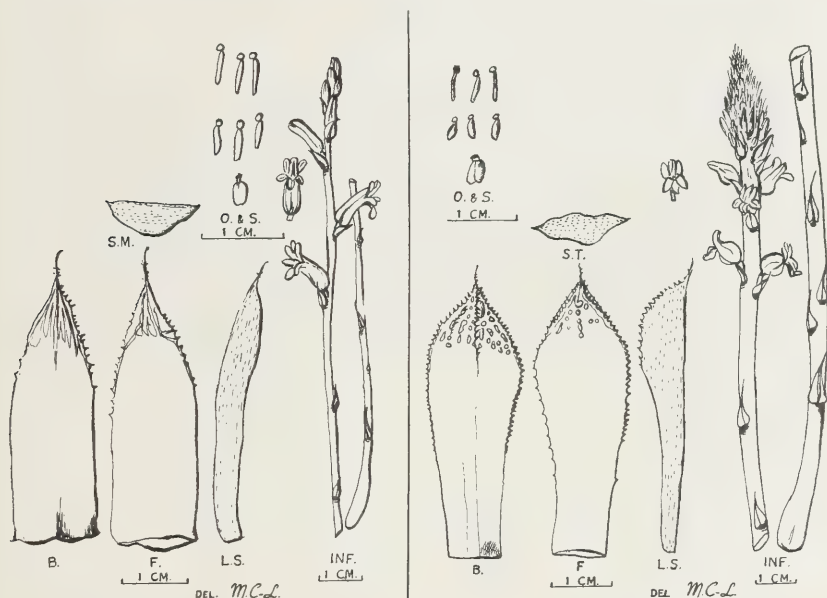
Peduncle simple, \pm terete, about $1\frac{1}{4}$ mm. diam. below, 20 cm. long including the few-flowered raceme, light reddish-brown below; *raceme* 6 cm. long, about 13 spirally arranged flowers and buds, 2 open simultaneously; *pedicels* 2 mm. long, 1 mm. diam., light green; *sterile bracts* 6, 6 mm. long, the lowest about 3 cm. from base of peduncle; *fertile bracts* 5 mm. long, deltoid, acute, white, with a broad dark brown nerve; *perianth* white, 16 mm. long, the cylindrical-triangular base $4\frac{1}{2}$ mm. across, constricted to 3 mm. above, spreading, curved; 3 *inner segments* obtuse, channelled, recurved, face colour pinkish-white at tip, pale pinkish-green below, with a nerve which is pink at tip and green below, that of the inner segment broad and of the 2 outer segments medium-fine; 3 *outer segments* obtuse, channelled, recurved, face colour white, each with a medium-fine nerve which is pink towards the tip, and greenish-brown below; *stamens* 5 and $4\frac{1}{2}$ mm. long; *ovary* $2\frac{3}{4}$ mm. long, $1\frac{1}{4}$ mm. diam., light green; *style* 1 mm. long, white, bent, capitate.

Habitat: Cape Province; East London Dist. (Type *G. G. Smith*, 6938, in East London Museum Herbarium.)

Distribution: Not further known.

This distinctive species I have pleasure in naming for Mr. W. T. Leighton of King William's Town, who collected it between King William's Town and Kayser's Beach, and who has from time to time sent me *Haworthia* plants collected by him in the Border area. The most striking character and one by which the plant is easily recognised is the dark red appearance of the leaves. In some cases even the new leaves of young and old plants have this colour, even though growing in part shade. In general appearance this new species is somewhat similar to *H. bilineata* Bak. but from which it can readily be distinguished by the colour of the leaves. When grown in the shade the red colour of the leaves partly disappears, but the lines remain reddish-green.

Haworthia globosiflora *G. G. Smith*. (Liliaceae-Aloineae.) Sect. Denticulatae.



H. leightonii.

FIG. 3.

H. globosiflora.

Foliorum rosula acaulescens, fere 8 cm. diam., e basi gradatim proliferata.

Folia circa 40, fere 45 mm. longa et in dimidio inferiore 15 mm. lata, obovata acuta; *supra* plano-concava levia, maculis prominentibus pellucidis, orbiculatis necnon oblongis, apicem versus induta; *infra* convexa levia; *margines et carina* dentibus 1 mm. longis indutae; *arista terminalis* 4 mm. longa, persistens.

Pedunculus simplex, 4 mm. diam., racemo incluso 25 mm. longus; *racemus* fere 6 cm. longus; *pedicelli* 4 mm. longi; *perianthium* 9—10 mm. longum.

Rosette acaulescent, about 8 cm. diam., not or slowly proliferous from the base.

Leaves about 40, the young erect, incurved, the old ascending-spreading, \pm incurved at tip, \pm tender, about 45 mm. long, about 15 mm. broad above the middle and about 10 mm. broad at base, about 6 mm. thick towards the tip, obovate acute; *face* flat-convex, smooth, with a number of raised pellucid round and oblong spots up to 1 mm. diam. near tip, smaller below, arranged mostly in longitudinal rows, some with teeth, with 5—6 \pm reticulate dark-brownish-green lines visible in the lower half, towards the tip brownish-green, becoming lighter green below, dull; *back* triangular-convex, smooth towards the tip, with a number of oblong pellucid spots in about 10 longitudinal rows and about 12 dark brownish-green lines, the leaf brownish-green towards the tip becoming lighter green below, dull; *margins* acute, from the base to the tip beset with pellucid white teeth which are about 1 mm. long near the tip, becoming smaller below and minute at base; *keel(s)* (1—)2, the one central, the other towards the margin and frequently on one of the rows of pellucid spots, with teeth in the upper half similar to those on the margins; *end-awn* 4 mm. long, white, minutely denticulate below, persistent.

Peduncle simple, about 4 mm. diam. near base, including the densely flowered raceme 25 cm. long, light brown below; *raceme* about 6 cm. long, about 40 spirally arranged flowers and buds, 4—6 open simultaneously; *pedicels* 4 mm. long, full mm. diam., dark green; *sterile bracts* 13—17, the upper ones 10 mm. long, the lower 15 mm. long and $3\frac{1}{2}$ cm. from base of peduncle; *fertile bracts* about 9 mm. long, deltoid, lanceolate, white with a fine brown nerve; *perianth* dull white, not stipitate, 9—10 mm. long, the cylindrical-triangular base 6 mm. across, constricted to 4 mm. above, spreading, \pm curved—*three inner segments* obtuse, channelled, recurved about 90 degrees, face colour of the upper one dark bronzy-brown, becoming light yellowish-white towards the base, the broad nerve light green below, becoming greenish-brown towards the tip, face colour of the 2 lower segments dull light bronze, becoming pale green towards the base, the

broad nerve green below, reddish-brown above; *three outer segments* obtuse, recurved about 90 degrees, face colour reddish brown, margins white to pinkish-white, the nerve greenish-brown below, darker above, the 2 upper segments flat, the tip of the lower one sharply incurved; *stamens* $3\frac{1}{2}$ and 4 mm. long; *ovary* 3 mm. long, $1\frac{3}{4}$ mm. diam., green; *style* $\frac{3}{4}$ mm. long, whitish, bent, capitate.

Habitat: Cape Province; Calvinia District. (Type *G. G. Smith* 7198, in East London Museum Herbarium.)

Distribution: Not further known.

This distinctive species is described from material collected by Mr. Thudichum, Curator of the Worcester Karroo Gardens, near Doornbosch, on the border of the Calvinia and Clanwilliam Distr. I first saw this plant in a collection at Calvinia in Jan. 1937, but no locality was recorded. It was later recorded by Miss Esterhuysen of the Bolus Herbarium (No. 6008) in Aug. 1941. In the leaf markings it is nearest to *H. nortieri* G. G. Smith, but is distinguished by its broader and acute leaves. Characteristic of *H. globosiflora* is the very short \pm globose based perianth.

CORRIGENDA.

Vol. IX-(1943). p. 94, 7th line from top: for "triangular-hexagonal" read "cylindrical-hexagonal".

p. 102, 13th line from bottom: for "*sterile bracts* $1\frac{1}{2}$ mm. long" read "*sterile bracts* 2; *fertile bracts* $1\frac{1}{2}$ mm. long".

Vol. XI (1945). p. 75, 7th line from bottom: for "oblong-obovate" read "oblong".
19th line from bottom: for "oblongato-ovata" read "oblonga".

Vol. XII (1946). p. 13, 3rd line from bottom: for "acute-lanceolate" read "acute-acuminate".

20th line from bottom: for "*Laetevirentes*" read "*Denticulatae*".

Vols. X (1944). pp. 22, 140; XI (1945). pp. 72, 74, 75, 76; XII (1946), pp. 1, 3, 5, 7, 8, 13, 41, 42. In first line of Latin description in each instance for "*rosetta*" read "*rosula*".



PLATE I.
Haworthia limifolia var. *Keithii*.
Haworthia nortieri var. *montana*.

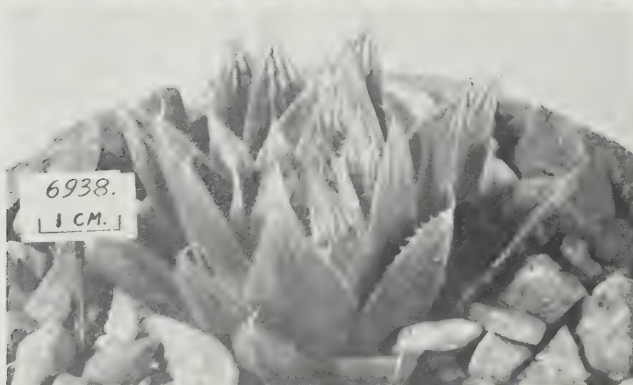
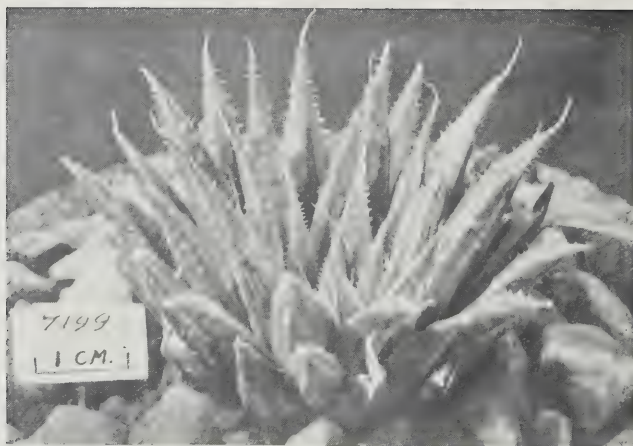


PLATE II.
Haworthia nortieri var. *giftbergensis*.
Haworthia leightonii.
Haworthia globosiflora.

DESCRIPTIONS AND CHANGES OF NAME.

By E. P. PHILLIPS.

In the course of preparing a second edition of my "Genera of South African Flowering Plants" (Botanical Survey of South Africa, Memoir No. 10, 1926), I have found it advisable to make various changes in nomenclature, as regards both genera and species. Certain new species have come to light. In the following pages some of these changes, descriptions and revisions are published.

When drawing up generic descriptions of the *Compositae*, I was confronted with a group of small Cape annuals, members of which had been placed in more than one genus by different authors. The problem was whether to place them in separate genera on characters which are not constant or to group them in one polymorphic genus. The genera involved are *Gamolepis* Less., *Steirodiscus* Less., and *Psilothonna* E. Mey. The "Flora Capensis" (vol. 3, p. 129) separated *Gamolepis* and *Steirodiscus* on the following characters:—

Gamolepis: Disc fertile; all the achenes glabrous.

Steirodiscus: Disc sterile; ray-achenes silky, fertile.

E. Meyer first gave the name *Psilothonna tagetes* in MS for a Cape plant collected by Drège. The species had previously been named *Othonna tagetes* by Linnaeus (Syst. ed. 10, 1234 (1758).) Lessing (Synops. Compos., p. 251 (1832)) placed it in the genus he described as *Gamolepis* and named it *Gamolepis annua*. Later, De Candolle (Prodr. vol. 6, p. 40 (1837)) retained the plant in *Gamolepis* and drew attention to it as the only annual in the genus; he placed it in a separate section for which he adopted E. Meyer's generic name *Psilothonna*. He was followed by Harvey (Fl. Cap., vol. 3, p. 156 (1864/65)) who also placed it in *Gamolepis* as the only annual.

This plant has an involucre in the form of a many-toothed cup and in this respect differs from *Gamolepis* in which the involucre-bracts are connate at the base only.

In *Steirodiscus* Less. (as defined in the "Flora Capensis") the four outstanding characters are (1) involucre of many scales in one row; (2) ovary of disc-floret glabrous; (3) branches of disc-style tipped with a cone and (4) the disc-florets are sterile. Specimens (Bols 8495 and Schlechter 8721) agree with those characters. In other specimens (e.g. Bols 8605, Schlechter 8974 named *Steirodiscus capillaceus* Less.) with the same habit, the appendage to the style-branches is present but the involucre is a toothed cup and the ovary villous; Schlechter 8358 (the type of

Steirodiscus schlechteri Bolus) agrees in three of the above characters but the disc-florets are fertile, while Galpin 11500 (named by Schlechter *Steirodiscus tagetes*) only agrees with the description of *Steirodiscus* in having glabrous ovaries.

It is not advisable to uphold genera on habit alone and there may be some justification for including the annuals concerned as a section in the genus *Gamolepis* as was done by De Candolle and Harvey with *Gamolepis tagetes*. From the records available, the woody plants I have retained in *Gamolepis* have a distribution from Bredasdorp to Natal and the Northern Transvaal, while the annuals are confined to the Cape and adjoining districts and for the sake of convenience are better kept together in a separate genus, and E. Meyer's name *Psilothonna* is accepted on grounds of priority.

PSILOTHONNA E. Mey., ex DC., Prodr., vol. 6, p. 40 (1837). (*Steirodiscus* Less.)

Heads many- or few-flowered, heterogamous, with marginal female florets and bisexual fertile or sterile disc-florets. *Receptacle* conical or convex, nude. *Involucre* ovoid or sub-globose or campanulate; bracts fused to form a many-toothed cup or bracts free to the base, lanceolate or linear-lanceolate, sometimes sub-acuminate, with membranous margins, glabrous. *Marginal-floret*: *Corolla-tube* from $1\frac{1}{2}$ to 4 times shorter than the limb, with a few scattered glandular hairs or glandular at the junction of the limb and the tube; limb obovate-oblong, broadly linear, or oblong, obtuse or 3-toothed. *Ovary* linear or oblong in outline, sometimes minutely sculptured, villous or glabrous; style linear or terete, sometimes swollen at the base; style-branches linear, obtuse. *Pappus* none. *Disc-floret*: *Corolla-tube* cylindric or tubular, campanulate or widening above, glabrous; lobes 5, lanceolate or ovate. *Anthers* linear or oblong, obtuse, with a linear or lanceolate appendage. *Ovary* oblong or linear in outline, sometimes finely sculptured, glabrous or villous; style linear or terete; style-branches truncate and penicillate or with a distinct appendage. *Pappus* none.

Glabrous annual herbs 6—12 inches high; leaves alternate, linear, pinnatisect with the lobes linear; heads solitary, peduncled, arranged in a lax corymb or panicle, rarely with only one terminal head on each plant.

Endemic; species 5. (Type: *P. tagetes* (L.) E. Mey.)

- | | | | | | |
|----|---|----|----|----|--------------------|
| 1. | Involucre-bracts fused to form a toothed cup | .. | .. | .. | 2 |
| | Involucre-bracts free to base or connate at base only | .. | .. | 4 | |
| 2. | Ovary villous | .. | .. | .. | 1 <i>gamolepis</i> |
| | Ovary glabrous | .. | .. | .. | 3 |

3. Glands at the junction of the corolla-tube and limb
of the ray-floret 2 *tagetes*
Glands absent from corolla of ray-floret 3 *speciosa*
4. Ovary villous 4 *capillacea*
Ovary glabrous 5 *schlechteri*
1. **P. gamolepis** (Bolus) Phill. = *Steirodiscus gamolepis* Bolus, Tulbagh Kloof, Sept., *Bolus* 8605 (type); Ceres Road, Sept., *Schlechter* 8974.
2. **P. tagetes** (Linn.) E. Mey. = *Othonna tagetes* Linn. = *Steirodiscus tagetes* Schltr. Malmesbury, Sept., *Galpin* 11500; Somerset Strand, Oct., *Nel* 1282; near Darling, Sept., *Bolus* 12734; near Cape Town, Sept., *Bolus* 7242; near Piquetberg, Oct., *Bolus* 13575.
3. **P. speciosa** (Pillans) Phill. = *Gamolepis speciosa* Pillans. Malmesbury district, *L. Bolus* (without number).
4. **P. capillacea** (Less.) Phill. = *Steirodiscus capillaceus* Less. Near Piquetberg, Oct., *Bolus* 8495; Koude Berg, Aug., *Schlechter* 8721.
5. **P. schlechteri** (Bolus) Phill. = *Steirodiscus schlechteri* Bolus, Windhoek, near van Rhynsdorp, July, *Schlechter* 8358 (type).

SUSANNA Phillips, gen. nov.

Capitula circa 14—20-flora, heterogama, radiata, floribus radii ♀ discique ♀ fertilibus vel paucae sterilibus. *Bractae* involucri 2—3-seriatae, lineares, apice acutae, pilosae. *Receptaculum* nudum. *Flores* ♀: *Tubus corollae* tubulosus, glaber vel sparse glandulosus; limbus ligulatus, 3-dentatus. *Ovarium* ovatum, pilosum; styli rami complanati, obtusi. *Pappi setae* barbellatae vel sub-plumosae, caducae, tubus colollae breviores vel longiores, cum 1—3 paleis parvis vel annulatis. *Flores* ♂: *Tubus corollae* basi tubulosus, sub apice sub-campanulatus; lobi 4—5, parvi, ovati. *Antherae* oblongae vel lineares, basi obtusae. *Ovarium* ovatum, pilosum; styli rami complanati, appendicibus lanceolatis. *Pappi setae* barbellatae vel sub-plumosae, caducae, tubus corollae aequales vel longiores, cum 1—3 paleis.

Herbae annuae, pilosae vel setosae; folia alterna vel opposita, linearia vel spatulata, pilosa vel setosa; capitula solitaria vel 2—4, ad apicem ramorum conferta, sub-sessilia vel pedunculata.

Endemic; species 3, ranging from the Riversdale district and parts of the Karoo to South West Africa. (Type: *S. microglossa* (DC.) Phill.)

In 1886, N. E. Brown named a Bolus specimen (No. 6538) *Amellus microglossus* DC. but added the following note "but this plant can scarcely belong to the genus *Amellus* and ill agrees with any other Cape genus; it will perhaps form a new genus". While I have not seen the Drège specimen, the type of *Amellus microglossa* DC., it may be assumed that Brown compared the Bolus specimen with the type which led him to

name it *A. microglossa* DC. but with the reservation made in his note. De Candolle (Prodr., vol. 5, p. 215) in the description of *A. microglossa* mentions very narrow paleae subtending the outer disc-florets but almost absent in the centre of the disc. As the genus *Amellus* has evident paleae on the receptacle, there appears to be sufficient justification for placing those plants with a nude receptacle into a distinct genus. The genus I have named after my wife.

- | | | | |
|----|--|---|--------------------|
| 1. | Outer involucre-bracts, sub-foliaceous | 1 | <i>epaleaceus</i> |
| | Outer involucre-bracts not foliaceous | 2 | |
| 2. | Capitula on peduncles longer than the head: ovary with an annulus at the apex | 2 | <i>dinteri</i> |
| | Capitula on peduncles shorter than the head or sub-sessile; ovary, at least of disc-florets, with 1—3 paleae at the apex | 3 | <i>microglossa</i> |

1. **S. epaleaceus** (O. Hoffm.) Phill.

Involucre campanulate; bracts in 3 rows; outermost bracts sub-foliaceous; inner bracts linear, with membranous margins; all more or less scabrid. *Receptacle* flat, nude. *Heads* several- to many-flowered. *Marginal-floret*: *Corolla-tube* tubular to cylindric, shorter than the limb, usually with a few scattered glandular hairs; limb broadly oblong to oblong-elliptic, 3-toothed. *Ovary* obovate or elliptic, pilose; style linear; style-branches linear, obtuse or sub-obtuse. *Pappus* of a few caducous barbellate bristles longer than the corolla-tube and a crown of short paleae. *Disc-floret*: *Corolla-tube* tubular below, widening or sub-campanulate above, usually with a few glandular hairs; lobes 5, small, ovate. *Anthems* linear, obtuse, with a lanceolate appendage. *Ovary* obovate-oblong or oblong-linear, pilose; style linear; style-branches linear, with a lanceolate glandular appendage. *Pappus* of a few caducous barbellate bristles as long as or almost as long as the corolla and a crown of short paleae.

Plants procumbent; branches pubescent or sub-glabrous; leaves alternate, linear or linear-spathulate, scabrid; heads solitary, mostly sessile or subsessile.

Distribution: Gordonias district, north of river at Kakamas, Sept., *Middlemost* (without number); South West Africa, Garius, Oct., *Dinter* 5023. (Type *Amellus epaleaceus* O. Hoffm. based on a specimen collected by Steingröver.)

2. **S. dinteri** Phill. sp. nov. *Bracteae* involucri 2—3-seriatae, margine membranaceae, ciliatae, pilosae. *Flores* ♀: *Limbus* corollae linearis vel lineare-oblongus. *Pappi* setae tubus corollae aequales. *Ovarium*

apice annulatum. Flores ♂: *Pappi* setae corolla aequalis. *Ovarium* apice annulatum.

Herba procumbens; folia linearia, pilosa; capitula pedunculata.

Involucre campanulate; bracts in 2—3 rows, linear, with membranous margins, ciliate, pilose on the back. *Receptacle* flat, nude. *Heads* many-flowered. *Marginal-floret*: *Corolla-tube* cylindric to tubular, shorter than the limb, glabrous or with a few scattered glandular hairs; limb linear or linear-oblong, 3-toothed. *Ovary* obovoid or elliptic in outline, glandular-pilose; style linear; style-branches linear, obtuse. *Pappus* of scabrid caducous bristles, longer than or as long as the corolla-tube, and an annulus on top of the ovary. *Disc-floret*: *Corolla-tube* tubular, widening above, with a few scattered glandular hairs; lobes 5, ovate or lanceolate. *Anthers* linear, obtuse, with a lanceolate appendage. *Ovary* elliptic or oblong, glandular-pilose; style linear; style-branches linear, with a lanceolate glandular appendage. *Pappus* of caducous scabrid bristles as long as the corolla and an annulus on top of the ovary.

Procumbent herbs; branches pilose; leaves alternate, linear, pilose; heads solitary, peduncled, with the peduncles much longer than the heads.

Distribution: South West Africa, Small Kares, Aug., *Dinter* 4880 (type); Halenberg, *Dinter* 6624; Klingh, *Dinter* 3860.

3. *S. microglossa* (DC.) Phill.

Involucre campanulate; bracts in 2—3 rows, linear, acute, pilose.

Receptacle nude. *Heads* several-flowered, with sometimes some of the disc-florets sterile. *Marginal-floret*: *Corolla-tube* tubular, about as long as the limb, sometimes sparsely glandular; limb oblong to oblong-linear, 3-toothed. *Ovary* obovate, villous; style linear; style-branches linear, obtuse. *Pappus* of a few caducous barbellate bristles shorter than the corolla-tube and 1—2 paleae. *Disc-floret*: *Corolla-tube* tubular below, sub-campanulate above; lobes 5, ovate. *Anther* oblong, blunt, with a lanceolate appendage. *Ovary* obovate, villous; style linear; style-branches linear, with a lanceolate appendage. *Pappus* of a few caducous barbellate bristles as long as the corolla-tube and 1—3 paleae, very rarely some florets without paleae.

Procumbent herbs; stems pilose or glabrescent; leaves alternate, rarely opposite, linear to linear-spathulate, pilose or glabrescent; heads solitary or more rarely 2—3, sessile or sub-peduncled, but then peduncles very rarely much longer than the heads.

Distribution: Riversdale district, Springfontein in Small Karoo, Aug., *Muir* 3649;* Ceres district, Spes Bona, *Marloth* 10360;*

* The Muir and Marloth specimens are merely dwarf forms.

Laingsburg district, Baviaans River, Whitehill, Aug., *Compton* 3248; 11226; Van Rhynsdorp district, Knechts Vlake, Aug., *Compton* 11333, south of Van Rhynsdorp, *Barker* 5721; Namaqualand, Paddegat, *Bolus* 6538. (Drège's specimen, which I have not seen, should be the type of the species.)

My thanks are due to the Director of the National Botanic Gardens, Kirstenbosch, and the Curator of the Bolus Herbarium for the loan of specimens.

***Eumorphia corymbosa* Phillips sp. nov.**

Capitula heterogama, radiata, floribus radii ♀ discique ♂ fertilibus. *Involucrum* ellipsoideum, bracteis 5-seriatis; bracteae ovatae vel lanceolatae, ciliatae, glabrae. *Receptaculum* paleolatum; paleae lineare-lanceolatae. *Corollae* radii ligulatae; lamina elliptica, 3-dentata. *Ovarium* costatum, glabrum; stylus divisus; rami apice obtusi. *Pappus* 0. *Corollae* disci tubulosae, glandulosae; lobi 5, ovati. *Antherae* lineares, basi minute caudatae. *Ovarium* plus minus ellipsoideum, costatum; stylus divisus; rami apice truncati. *Pappus* 0.

Frutex; folia opposita, linearia, integerrima, glabra; capitula parva, apices ramorum corymbosa.

Distribution: Beaufort West district, top of Molteno Pass, 5,500 ft., May, *Acocks* 14340.

Heads few-flowered, heterogamous, with 2—3 female marginal florets and bisexual fertile disc florets. *Involucre* ellipsoid; bracts in 5 rows, ovate to lanceolate, ciliate, glabrous. *Receptacle* flat, paleate; paleae almost as long as the disc-florets, linear-lanceolate. *Marginal-florets*: *Corolla-tube* shorter than the limb, tubular, sparsely glandular; limb elliptic, 3-toothed. *Ovary* ellipsoid, ribbed, glabrous; style terete; style-branches linear, obtuse. *Pappus* none. *Disc-floret*: *Corolla-tube* tubular, widening upwards, glandular; lobes 5, ovate. *Anthers* linear, minutely tailed, with a lanceolate appendage. *Ovary* more or less ellipsoid, ribbed, glabrous; style terete; style-branches linear, truncate. *Pappus* none.

A glabrous woody shrub; leaves opposite, narrow-linear; heads small, corymbose at the ends of the branches.

The leaves resemble those of *E. davyi* Bolus. It differs from other species of the genus in the corymbose arrangement of the heads.

***Asaemia inermis* Phillips sp. nov.**

Capitula pauciflora, homogama, discoidea, floribus omnibus ♀ fertilibus. *Involucrum* ovoideum; bracteae 5-seriatae, siccae, ovatae, oblongae vel lineares. *Receptaculum* planum, nudum. *Tubus* corollae, tubulosus; lobi 5, lanceolati. *Antherae* lineares, basi obtusae. *Ovarium*

oblongum, 3-angulatum, glabrum; stylus teres; rami apice truncati, penicillati. *Pappus* 0.

Frutex inermis; folia opposita, basi connata, linearia, glabra; capitula sessilia, solitaria, terminalia.

Distribution: Laingsburg district, Matjesfontein, Oct., *Cannon in Herb. Marloth* 10854 (Type); *Foley in National Herb.* 1658; Ceres district, Spes Bona, Sept., *Marloth* 10371; van Rhynsdorp districts, Oct., *Duckitt in National Herb.* 28425.

The species differs from *A. axillare* (Thunb.) Harv. in being spineless.

Matricaria andreae Phillips sp. nov.

Involucrum campanulatum; bracteeae 4-seriatae, oblongo-lanceolatae, margine membranaceae, ciliatae, pilosae. *Receptaculum* subglobosum, nudum. *Capitula* multiflora, heterogama, radiata, floribus radii ♀ discique ♂ fertilibus nunc pluribus sterilibus. *Receptaculum* subglobosum, nudum. *Flores radii*: *Tubus corollae* 0; limbus obovato-oblongus, apice obtusus. *Ovarium* oblongum, margine membranaceum, glabrum; styli rami complanati, obtusi. *Pappus* 0. *Flores disci*: *Tubus corollae* tubulosus; lobi 4, ovati. *Antherae* lineares, basi obtusae. *Ovarium* oblongum, margine membranaceum, glabrum; stylus basi globosus; rami complanati, truncati. *Pappus* 0.

Herbae nanae; folia radicalia, petiolata, pinnatisecta, pilosa; capitula pedunculata; radii albi.

Distribution: Prince Albert district, Seven Weeks Poort c. 6300 ft., Dec., *Andreae* 1226 (Type); *Stokoe* 1908. Worcester district, summit Buffelshoek Peak, Dec., *Esterhuysen* 14848.

The above specimens were found growing on wet rock faces.

Macowania conferta (Benth.) Phillips nov. comb. = *Homochaete conferta* Benth. Natal, Cathedral Peak, 7,000—8,000 ft., *Esterhuysen* 10216; Drakensberg, July, Marriott in *National Herb.* 22503. I find it impossible to keep the two genera *Macowania* and *Homochaete* apart, and in my MSS. have only recognised the first genus.

Cotula pedunculata (Schltr.) Phillips nov. comb. = *Otochlamys pedunculata* Schltr.

In the course of work on the genera of the *Scrophulariaceae*, I found difficulty in satisfactorily separating the genera *Aptosimum* Burch. and *Peliostomum* E. Mey. Bentham in the "Botanical Register" under tab. 1882, in proposing the genus *Peliostomum*, relied mainly on the shape of the capsule which he describes as obcordate in *Aptosimum* and acute in *Peliostomum*; the corolla, stamens, and pistil in *Peliostomum* he describes

as similar to those of *Aptosimum*. Both the "Flora Capensis" and the "Flora of Tropical Africa" follow Bentham in relying on the shape of the capsule for separating the two genera and both introduce another character viz. that in *Aptosimum* the anthers of the posterior pair of stamens are often empty, while in *Peliostomum* they are perfect. In some other genera of the *Scrophulariaceae* which occur in South Africa e.g. *Anticharis*, *Diascia* and *Manulea*, the stamens are not always equal and perfect. That some species of *Aptosimum* may have only two perfect stamens cannot be accepted as a good diagnostic character for separating the two genera.

The species of *Aptosimum* and *Peliostomum* in general habit differ no more than the habit of species in other genera of the family. An examination of the floral characters of the species in the National Herbarium failed to reveal any tangible character which could be used to separate the two genera. I therefore propose to sink *Peliostomum* E. Mey. under *Aptosimum* Burch. which is the older generic name. The following name changes are then necessary:—

Aptosimum virgatum (E. Mey.) Phill. = *P. virgatum* E. Mey.

A. oppositifolium (Engl.) Phill. = *P. oppositifolium* Engl.

A. viscosum (E. Mey.) Phill. = *P. viscosum* E. Mey.

A. origanoides (E. Mey.) Phill. = *P. origanoides* E. Mey.

A. leucorrhizum (E. Mey.) Phill. = *P. leucorrhizum* E. Mey.

A. lugardae (N. E. Br.) Phill. = *P. lugardae* N. E. Br.

Alectra pusilla Phillips sp. nov.

Calyx 7 mm. longus, 5-lobatus; tubus 3 mm. longus, campanulatus; lobi 4 mm. longi, lanceolato-lineares. *Tubus corollae* 7 mm. longus, sub-campanulatus; lobi ovati. *Stamina* 4, inclusa; filamenta circa basi tubae corollae inserta, curvata, glabra vel sparse hirsuta; antherae 2-thecae, glabrae. *Ovarium* orbiculatum; stylus teres; stigma membranaceum et dilatatum.

Herba pusilla, acaulescens, circa 1—2 cm. alta; folia 0.5—1 cm. longa, linearia vel lanceolato-linearia, scabrida.

South West Africa: Kanovley, May 1934, Dinter 7224.

Alectra basutica Phillips nov. comb. = *Melasma basuticum* Phillips.

THE GERMINATION OF THE SEEDS OF ANGIO-SPERMOUS ROOT-PARASITES.

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PART I. THE NATURE OF THE CHANGES OCCURRING DURING PRE-EXPOSURE OF THE SEED OF *ALECTRA VOGELII* BENTH.

INTRODUCTION.

In a previous paper (Botha, 1948) it was pointed out that the germination of the seed of *Alectra Vogelii* is host-dependent. The roots of the host plants (leguminous species) exude a substance or complex of substances which activates this germination process.

Germination can be obtained *in vitro* by adding a solution of the host-root exudations to the seed. When the seed is exposed to moist and warm conditions before the active substance is added (a process which I have termed "pre-exposure") it becomes more sensitive to this chemical stimulus. This phenomenon may be due to one or more of several causes. In the present investigation two possibilities were considered, viz.: (1) The seed may contain a germination inhibitor which diffuses outward during pre-exposure; and (2) the changes which occur during pre-exposure may be of a metabolic nature and may consequently belong to the germination process as such. With regard to (2) the influence of atmospheric oxygen on the changes occurring during pre-exposure was investigated.

GERMINATION TECHNIQUE.

Although good results were obtained with the germination technique previously described (Botha, 1948), this method proved to be somewhat cumbersome. It was therefore decided to study the question of a convenient germination test once more, particularly for the purpose of devising a method that would allow of an adequate number of replications in elaborate experiments. After some experimentation it was found that a modification of the hanging-drop method described by Brown and Edwards (1944) for the germination of the seed of *Striga lutea* suited the purpose satisfactorily. For purposes of future reference this method as modified by me is here described in some detail.

(a) *Preparation of the Host Solution.*—A number of cowpea seeds are germinated in clean river sand. When the seedlings are about 10 days old two of them are carefully removed, and their roots thoroughly rinsed

in distilled water. These plants are then transferred to a 30 ml. capacity test tube which is filled with distilled water. They are held in position with a cotton-wool plug in the mouth of the test tube. The test tube is darkened but the aerial parts of the plants are exposed to daylight. In summer they are kept at room temperature; in winter they are incubated at 25°C. during the night. After a few days the water in the test tube is replaced by fresh distilled water. Forty-eight hours later this water, which now contains the exudations of the host roots, is poured off. The solution thus obtained, is used to activate the seed of the parasite.

From some of my unpublished data it is clear that when the host solution is stored in the refrigerator at a temperature slightly above freezing point its activity remains more or less constant for a month and longer. Solutions stored in this way can therefore be used when a consecutive series of germination tests are to be carried out within certain time limits, thus obviating the necessity of preparing a fresh solution for each germination test.

(b) *Pre-exposure of the Parasite's Seed.*—The method of pre-exposure of the *Alectra* seed is the same as that described elsewhere (Botha, 1948). The seed is sown between two discs of moist filter paper, placed in a Petri dish on moist sand and incubated for 10 days at 30°C.

(c) *Application of the Host Factor.*—Micro-culture slides with polished, spherical concavities of 18×0.8 mm. proved to be quite convenient for the hanging-drop cultures, 50 to 100 seeds being used per drop of host solution. The cultures are incubated for 3 days at 30°C. and the percentage germination is then determined under the microscope.

The conditions specified above are more or less optimal. When good, viable seeds are used and the method is carried out as described above, the percentage germination often reaches 100. This technique, therefore, served as a standard, being modified however to suit the requirements of each particular experiment.

During the present investigation the modifications introduced concerned the method of pre-exposure. These will be considered when the separate experiments are discussed.

EXPERIMENT TO INVESTIGATE THE POSSIBLE PRESENCE OF A GERMINATION INHIBITOR.

(a) *Method.*—This experiment was based on the assumption that if a germination inhibitor which diffuses outward during pre-exposure of the seed, were present, such leakage from the seed could be accelerated by exposing it to dripping water.

Two aliquot lots of seed were used; the one was pre-exposed in dripping water at 30°C., while the other was pre-exposed in the usual way in a Petri

dish at 30°C. After varying time intervals the germination capacity of the two lots was determined and compared.

The procedure of exposing the one lot of seed to dripping water was as follows: The seed was sown more or less in the centre of a disc of damp filter paper and then covered by a second disc. The paper was folded and fitted into a funnel. Distilled water was then dripped continuously from a reservoir onto the seed in the funnel, the run-off being collected in a basin beneath the funnel. From time to time the water in the reservoir was replenished. The apparatus was set up entirely within an incubator which was adjusted at 30°C.

At the time intervals indicated in Table 1 samples of each of the two lots of seed were removed for germination tests. Each test included six replications. Drops of the same host solution, which was stored at 1°C., were used for all cultures. At regular intervals this solution was tested with "sensitized" seed and it was found that its activity remained more or less constant at a high level during the entire experimental period.

(b) *Results.*—The results obtained and their statistical analysis are presented in Tables 1, 2, 3 and 4.

TABLE 1.

THE EFFECT OF TIME OF PRE-EXPOSURE AND METHOD OF PRE-EXPOSURE ON THE PERCENTAGE GERMINATION.

Time of Pre-exp. (Days).	Mean Percentage Germination.	
	Pre-exp. in dripping water.	Pre-exp. in usual way.
1	17.7	6.0
2	45.5	30.7
3	49.0	33.5
5	71.4	65.5
6	71.0	72.8
8	77.1	82.7
Least Sign. Diff. (P=0.05)		8.0

TABLE 2.

ANALYSIS OF VARIANCE OF THE RESULTS OBTAINED.

Component.	Degrees of freedom.	Sum of Squares.	Mean Square.	F	P
Replications	5	15.81	3.16	0.064	>0.05
Time of Pre-exp. ..	5	40387.51	8077.50	164.177	<0.01
Method of Pre-exp. ..	1	821.48	821.48	16.697	<0.01
Time × Method	5	1175.56	235.11	47.787	<0.01
Error	55	2706.02	49.20	—	—
Total ..	71	45106.38	—	—	—

TABLE 3.

THE EFFECT OF TIME OF PRE-EXPOSURE ON THE PERCENTAGE GERMINATION.

Time of Pre-exp. (Days).	1	2	3	5	6	8	Least sign. Diff. ($P=0.05$).
Percentage Germination ..	11.8	38.1	41.2	68.4	71.9	79.9	5.7

TABLE 4.

THE EFFECT OF METHOD OF PRE-EXPOSURE ON THE PERCENTAGE GERMINATION.

Method of Pre-exposure.	Percentage Germination.
In dripping water	55.3
In usual way	48.5
Least sign. diff. ($P=0.05$) ..	3.3

From Table 2 it is clear that the only component not attaining significance is "replications". The time of pre-exposure as well as the manner in which pre-exposure was carried out, had a highly significant effect on the percentage germination (Tables 2, 3 and 4). The interaction between these two components was also highly significant (Table 2).

It is evident from Table 1 that up to the third day the seed which had been pre-exposed in dripping water, germinated significantly better than that which had been pre-exposed in the Petri dish. For the fifth, sixth and eighth days the differences in percentage germination between the two methods of pre-exposure are, however, not significant.

It is therefore clear that during the first few days of pre-exposure the changes induced by this process are obviously accelerated by treatment with dripping water, but after that this effect disappears.

EXPERIMENT TO INVESTIGATE THE EFFECT OF OXYGEN ON THE CHANGES OCCURRING DURING PRE-EXPOSURE OF THE SEED.

(a) *Method.*—In this experiment two aliquot lots of seed were again used: The one was pre-exposed in the absence of and the other in the presence of oxygen.

In the former case the seed was sown between filter paper and placed on 100 gm. of sand in a 250 ml. flask. The flask was then filled with water which had previously been boiled (to expel the dissolved oxygen) and

cooled quickly. This water was displaced by oxygen-free air obtained as follows: The air was slowly and carefully pumped through a long Pettenkofer tube containing a freshly prepared solution of pyrogallate of potash. After leaving this solution it bubbled through oxygen-free water before entering the flask containing the seed. As soon as all the "free" water in this flask had been displaced, it was sealed and incubated at 30°C.

The second lot of seed was treated in a similar manner, except that the flask in which it was pre-exposed was filled with unboiled water and that this water was displaced by pumping in air from which no oxygen had been removed.

After pre-exposure for 6 days germination tests were carried out with samples of both lots of seed, using drops of the same host solution for all cultures. Each test was replicated 6 times. The remaining seed was, in both cases, transferred to Petri dishes and pre-exposed in the usual way at 30°C. for another 14 days, after which germination tests were again carried out.

(b) *Results*.—The results presented in Table 5 clearly indicate that the changes brought about by pre-exposure cannot take place in the absence of oxygen. Absence of oxygen does not, however, impair the

TABLE 5.

THE EFFECT OF OXYGEN DURING PRE-EXPOSURE OF THE SEED AS REFLECTED BY THE PERCENTAGE GERMINATION (SEED PRE-EXPOSED AT 30°C. FOR SIX DAYS).

Replication No.	Percentage Germination.						Mean.
	1	2	3	4	5	6	
Pre-exposure in Absence of Oxygen	0·0	0·0	0·0	0·0	0·0	0·0	0·0
Pre-exposure in Presence of Oxygen	91·4	87·1	73·9	72·0	56·6	55·7	72·8

TABLE 6.

THE GERMINATION OF THE SEED ORIGINALLY PRE-EXPOSED AS INDICATED IN TABLE 5 AND THEN PRE-EXPOSED IN PETRI DISHES FOR 14 DAYS AT 30°C.

Replication No.	Percentage Germination.						Mean.
	1	2	3	4	5	6	
Originally pre-exposed in Absence of Oxygen ..	61·4	35·3	43·6	42·6	51·2	59·6	49·0
Originally pre-exposed in Presence of Oxygen ..	73·3	82·4	78·9	89·3	80·2	87·7	82·0

For $t=6.817$ and $n=10$, $P<0.01$.

viability of the seed altogether. When such treatment is followed by pre-exposure under aerobic conditions most of the individual seeds regain their capacity to germinate, although the percentage germination is not as high as that of seed which has not been pre-exposed under oxygen-free conditions (Table 6).

CONCLUSIONS.

From the evidence gained during the present investigation, it remains an open question whether a germination inhibitor is present in the seed of *Alectra Vogelii*. In view of the fact that the changes induced by pre-exposure cannot take place in the absence of oxygen, the results of Table 1 may simply be explained as follows: The seed pre-exposed in dripping water was better supplied with oxygen than that pre-exposed in the Petri dish, and hence the percentage germination for the former was higher than that for the latter, up to the third day of pre-exposure.

Although purely physical processes, such as the outward diffusion of a germination inhibitor(s), may be involved in the changes of pre-exposure, it is clear that these changes cannot be ascribed solely to such processes. Obviously they are, at least partly, of a metabolic nature, being associated in some way or other with aerobic respiration. This view supports the idea previously put forward (Botha, 1948), viz. that the changes occurring during pre-exposure belong to the germination process as such. The entire germination process can be divided into the following two phases: (1) Under the influence of moist and warm conditions certain changes, which are, at least partly, of a metabolic nature, take place, resulting in the seed becoming more sensitive to the active substance; and (2) under the influence of the host factor the radicle starts growing. In Part II I shall present further evidence on the metabolic nature of the changes mentioned under (1).

SUMMARY.

1. A micro-culture technique for the germination of the seed of *Alectra Vogelii* is described.

2. No definite evidence was found that the seed of *A. Vogelii* contains a germination inhibitor which diffuses outward during pre-exposure.

3. It is shown that the changes of pre-exposure cannot take place in the absence of oxygen. These changes are, therefore, probably of a metabolic nature, being associated in some way or other with aerobic respiration.

PART II. THE EFFECT OF TIME OF PRE-EXPOSURE,
TEMPERATURE OF PRE-EXPOSURE AND CONCENTRATION
OF THE HOST FACTOR ON THE GERMINATION OF THE SEED
OF *ALECTRA VOGELII* BENTH.

INTRODUCTION.

When the seed of *Alectra Vogelii* is pre-exposed, i.e. subjected to moist conditions before the host stimulant (active substance) is added, it becomes more sensitive to the latter (Botha, 1948). This process of sensitization does not take place in the absence of oxygen and is therefore obviously of a metabolic nature, being associated in some way or other with aerobic respiration (Botha, Part I, above).

The object of the present investigation was to throw more light on the nature of the changes induced by pre-exposure. With this in mind the effect of several external factors on the germination process was studied. This paper is limited to a consideration of three of these factors, viz. time of pre-exposure, temperature of pre-exposure and concentration of the active substance exuded by the host roots. Three experiments were carried out, in each of which the effect of two of the factors mentioned was studied simultaneously.

METHODS.

The germination tests were carried out according to the technique described above (Botha, Part I). The experimental procedure for each particular experiment was as follows:—

(1) *Experiment on the Effect of Time of Pre-exposure and Concentration of the Host Factor.*—Three aliquot lots of the seed of the parasite were pre-exposed at 30°C., the first lot for 9 days, the second for 6 days and the third for 3 days. Pre-exposure was undertaken at three-day intervals, so that the three periods mentioned elapsed simultaneously. Hanging-drop cultures were then begun with the pre-exposed seed, five different concentrations of the host solution being applied in each case, and each germination test being replicated four times. The concentration of the active substance in the undiluted host solution was taken to be 100 arbitrary units. By diluting portions thereof with appropriate amounts of distilled water solutions with concentrations of 50, 25, 12·5 and 6·25 arbitrary units were prepared. The activity of these solutions as well as that of the undiluted solution was tested.

(2) *Experiment on the Effect of Time of Pre-exposure and Temperature of Pre-exposure.*—This experiment was carried out during the winter

when the temperature factor could be varied over a larger range than in summer.

Fifteen aliquot lots of seed were used, of which 5 were pre-exposed for 9 days, 5 for 6 days and 5 for 3 days. For each of these periods each lot of seed was pre-exposed at a different temperature, the temperatures of pre-exposure being 10–12°C., 25°C., 30°C., 35°C. and 40°C. As in the previous experiment pre-exposure was undertaken at 3-day intervals so that the germination tests could be carried out simultaneously, and drops obtained from the same fresh and undiluted host solution could be used for all the cultures. Each test was replicated four times.

(3) *Experiment on the Effect of Temperature of Pre-exposure and Concentration of the Host Factor.*—This experiment was also carried out during the winter. Three aliquot lots of seed were simultaneously pre-exposed for 9 days, the first at 10–12°C., the second at 20°C. and the third at 30°C. Hanging-drop germination tests were then carried out, four different concentrations of the host solution being applied in each case, and each test being replicated five times. The host solutions were prepared as described under (1) and the following concentrations were applied: 100, 50, 25 and 12·5 arbitrary units.

RESULTS.

(1) *The Effect of Time of Pre-exposure and Concentration of the Host Factor.*—The results of the first experiment and their statistical analysis are presented in Tables 1, 2, 3 and 4.

From Table 2 it is clear that the only component which did not attain significance is "replications". The time of pre-exposure as well as the concentration of the active substance had a highly significant effect on the percentage germination, and the interaction between these two factors was also highly significant.

The mean values for the three periods of pre-exposure (Table 3) differ significantly from one another, the percentage germination being lowest for the three-day period and highest for the nine-day period. It is therefore clear that as the period of pre-exposure is lengthened, the percentage germination increases.

From Table 4 it is obvious that the percentage germination also increases with an increase in the concentration of the active substance up to a certain point. The means for 25 and 50 units as well as those for 50 and 100 units do not differ significantly, but all other differences are significant.

The most important feature of these data is the fact that the value for the interaction between the two factors studied is large. It is evident from Table 1 that:

TABLE 1.

THE EFFECT OF TIME OF PRE-EXPOSURE AND CONCENTRATION OF THE HOST
SOLUTION ON THE PERCENTAGE GERMINATION.

Time of Pre- exposure (Days).	Concentration of the Host Solution (Arbitrary Units).	Mean Percentage Germination.
3	6.25	35.5
	12.5	50.2
	25.0	59.7
	50.0	68.3
	100	76.5
6	6.25	55.9
	12.5	73.9
	25.0	85.5
	50.0	84.0
	100	86.4
9	6.25	86.8
	12.5	83.9
	25.0	91.1
	50.0	91.6
	100	87.3
Least Significant Difference ($P=0.05$)		8.2

TABLE 2.

ANALYSIS OF VARIANCE OF THE DATA OF THE FIRST EXPERIMENT.

Component.	Degrees of Freedom.	Sum of Squares.	Mean Square.	F	P
Replications	3	74.39	24.80	0.7521	>0.05
Concentration	4	4788.53	1197.13	36.31	<0.01
Time	2	9293.65	4646.83	140.94	<0.01
Conc. \times Time	8	2118.86	264.86	8.033	<0.01
Error	42	1384.78	32.97	—	—
Total	59	17660.21	—	—	—

TABLE 3.

THE EFFECT OF TIME OF PRE-EXPOSURE ON THE PERCENTAGE GERMINATION.
(FIRST EXPERIMENT.)

Time of Pre-exp. (Days)	3	6	9	Least Sign. Diff. ($P=0.05$).
Mean Percentage Germination	58.0	77.1	88.2	3.7

TABLE 4.

THE EFFECT OF THE CONCENTRATION OF THE HOST FACTOR ON THE PERCENTAGE GERMINATION (FIRST EXPERIMENT).

Concentr. of Host Factor (Arb. Units)	6.25	12.5	25.0	50.0	100	Least Sign. Diff. ($P=0.05$).
Mean Percentage Ger- mination	59.4	69.3	78.7	81.3	83.4	4.7

(a) With a pre-exposure period of 3 days all the differences between the means for the different concentrations of the active substance are significant.

(b) With a pre-exposure period of 6 days the differences between the means for 25 units, 50 units and 100 units are non-significant, while the means for 6.25 units and 12.5 units differ significantly from each other and from those for the other concentrations.

(c) With a pre-exposure period of 9 days all the differences between the means for the different concentrations are non-significant.

(d) With concentrations of 6.25 and 12.5 units all the differences between the means for the different periods of pre-exposure are significant.

(e) With concentrations of 25, 50 and 100 units the means for three days are significantly lower than those for the other two periods of pre-exposure, while the differences between the means for 6 days and 9 days are non-significant.

From (a)—(c) it follows that the effect of the concentration of the active substance is much more pronounced after relatively short periods of pre-exposure than after longer periods; and from (d) and (e) it follows that the time of pre-exposure has a greater effect when low concentrations of the active substance are applied than when relatively high concentrations are applied. As far as their effect on the percentage germination is concerned, the factors time of pre-exposure and concentration of the active substance can, at least partly, replace one another. After a relatively short period of pre-exposure a high percentage germination can be obtained by applying a high concentration of the active substance; and, conversely, a low concentration of the active substance combined with a relatively long period of pre-exposure also produces a high percentage germination.

(2) *The Effect of Time of Pre-exposure and Temperature of Pre-exposure.*—The results of this experiment and their statistical analysis are presented in Tables 5, 6, 7 and 8.

TABLE 5.

THE EFFECT OF TIME OF PRE-EXPOSURE AND TEMPERATURE OF PRE-EXPOSURE ON
THE PERCENTAGE GERMINATION.

Time of Pre-exposure (Days).	Temperature of Pre-exposure (°C.)	Mean Percentage Germination.
3	10-12	2.7
	25	11.3
	30	43.7
	35	53.8
	40	17.2
6	10-12	7.8
	25	44.6
	30	61.3
	35	78.8
	40	24.7
9	10-12	5.3
	25	74.1
	30	92.9
	35	95.0
	40	28.4
Least Significant Diff. (P=0.05) ..		10.4

TABLE 6.

ANALYSIS OF VARIANCE OF THE DATA OF THE SECOND EXPERIMENT.

Component	Degrees of Freedom.	Sum of Squares.	Mean Square.	F	P
Replications	3	500.32	166.77	3.161	0.05-0.01
Time	2	11188.99	5594.50	106.04	<0.01
Temperature	4	40999.64	10249.91	194.29	<0.01
Time × Temp.	8	5462.86	682.86	12.94	<0.01
Error	42	2215.80	52.757	—	—
Total	59	60367.61	—	—	—

TABLE 7.

THE EFFECT OF TIME OF PRE-EXPOSURE ON THE PERCENTAGE GERMINATION.
(SECOND EXPERIMENT.)

Time of Pre-exposure (Days)	3	6	9	Least Sign. Diff. (P=0.05).
Mean Percentage Germination	25.7	43.5	59.1	4.6

TABLE 8.

THE EFFECT OF TEMPERATURE OF PRE-EXPOSURE ON THE PERCENTAGE GERMINATION.
(SECOND EXPERIMENT).

Temp. of Pre-exp. (°C.) ..	10-12	25	30	35	40	Least Sign. Diff. (P=0.05).
Mean Percentage Germination	5.2	43.3	66.0	75.9	23.4	6.0

From Table 6 it is obvious that both treatments, viz. time of pre-exposure and temperature of pre-exposure, as well as the interaction between these two factors had a highly significant effect on the percentage germination. All the differences between the means for time of pre-exposure (Table 7) are significant; with an increase in this factor the percentage germination likewise increases.

From Table 8 it is clear that under cool conditions the changes induced by pre-exposure take place very slowly, but as the temperature rises, their rate increases until an optimum is reached in the vicinity of 35°C. At 40°C. there is, however, a very considerable decrease in the percentage germination.

From Table 5 it is evident that:

(a) The optimum temperature of pre-exposure obviously lies in the vicinity of 35°C., although the means obtained for 3 days at 35°C. and 9 days at 35°C. do not differ significantly from those obtained for 3 days at 30°C. and 9 days at 30°C. respectively. All means for pre-exposure at 40°C. are considerably lower than those for pre-exposure at 35°C.

(b) Under cool conditions (10-12°C.) the time of pre-exposure has no significant effect on the percentage germination. All the values obtained for this temperature are very low. At 25°C., 30°C. and 35°C. a lengthening of the time of pre-exposure is, however, accompanied by a distinct increase in the percentage germination. At 40°C. this effect is also noticeable, but to a markedly lesser extent.

(3) *The Effect of Temperature of Pre-exposure and Concentration of the Host Factor.*—The results of the third experiment and their analysis are presented in Tables 9, 10, 11 and 12.

These results confirm the evidence of the previous two experiments, viz. that the temperature of pre-exposure as well as the concentration of the host solution has a highly significant effect on the percentage germination. The interaction between these two factors is also highly significant (Table 10).

It is evident from Table 11 that all the differences between the means for temperature are significant. With regard to the effect of concentration (Table 12) the only difference not attaining significance is that between the means for 50 and 100 units.

TABLE 9.

THE EFFECT OF TEMPERATURE OF PRE-EXPOSURE AND CONCENTRATION OF THE
HOST SOLUTION ON THE PERCENTAGE GERMINATION.

Temperature of Pre-exposure (°C.)	Concentration of Host Solution (Arbitrary Units).	Mean Percentage Germination.
10-12°.	12.5	2.5
	25	3.2
	50	18.9
	100	20.0
20°.	12.5	35.4
	25	49.5
	50	67.1
	100	68.0
30°.	12.5	81.3
	25	91.0
	50	93.5
	100	92.6
Least Significant Difference (P=0.05) ..		7.4

TABLE 10.

ANALYSIS OF VARIANCE OF THE DATA OF THE THIRD EXPERIMENT.

Component.	Degrees of Freedom.	Sum of Squares.	Mean Square.	F	P
Replications	4	145.85	36.463	1.085	>0.05
Temperature	2	61883.85	30941.93	920.57	<0.01
Concentration	3	4448.42	1482.81	44.116	<0.01
Temp. × Conc.	6	1068.89	178.15	5.300	<0.01
Error	44	1478.92	33.612	—	—
Total	59	69025.93	—	—	—

TABLE 11.

THE EFFECT OF TEMPERATURE OF PRE-EXPOSURE ON THE PERCENTAGE GERMINATION.
(THIRD EXPERIMENT.)

Temperature of Pre-exposure (°C.)	..	10-11	20	30	Least Sign. Diff. (P=0.05).
Mean Percentage Germination	11.1	55.0	89.6	3.7

TABLE 12.

THE EFFECT OF CONCENTRATION OF THE HOST SOLUTION ON THE PERCENTAGE GERMINATION. (THIRD EXPERIMENT.)

Conc. of Host Solution (Arb. Units)	12.5	25	50	100	Least Sign. Diff. (P=0.05).
Mean Percentage Germination . .	39.7	47.9	59.8	60.2	4.3

From Table 9 it is clear that:

(a) With pre-exposure at 10–12°C. the difference between the means for 12.5 and 25 units, as well as that between the means for 50 and 100 units is non-significant, while all other differences between the means for concentrations are significant.

(b) With pre-exposure at 20°C. the only difference for concentration not attaining significance is that between the means for 50 and 100 units.

(c) With pre-exposure at 30°C. the mean for 12.5 units differs significantly from those for all other concentrations, while the other differences between means for concentrations are non-significant.

(d) With all concentrations of the host solution the means for temperature of pre-exposure differ significantly from one another.

From these results it is evident that under the conditions of this experiment the effect of temperature of pre-exposure is more pronounced than that of concentration of the host factor. Under cool conditions the changes induced by pre-exposure occur so slowly that the percentage germination remains small even when relatively high concentrations of the active substance are applied. If the seed is, on the other hand, pre-exposed at a favourable temperature (30°C.) even a relatively low concentration of the active substance induces a high percentage germination.

CONCLUSIONS.

With regard to the germination of the seed of *Striga lutea* Brown (1946) and Brown and Edwards (1946) put forward the tentative hypothesis that during "pretreatment" the seed itself forms a stimulating substance which is the same as or similar to that which originates in the host root. To my mind this idea offers the best explanation of at least one of the changes occurring during pre-exposure of the seed, not only in the case of *S. lutea* but also of some other angiospermous root-parasites.

The results of the present investigation are quite consistent with this hypothesis and may be interpreted as follows: During its phylogenetic development *Alectra Vogelii* has, to a great extent, lost the capacity for synthesis of some substance or other which is essential for the germination of its seed. This loss of the ability to synthesize is not complete. When

the seed is exposed to moist conditions the stimulating substance is gradually produced in it. The vast majority of the individual seeds are, however, incapable of synthesizing this substance in quantities sufficient to produce germination. In these seeds the amount of substance produced has to be supplemented with the host stimulant.

As the substance formed in the seed gradually accumulates during pre-exposure, lower concentrations of the host stimulant will be required to induce germination after relatively long periods of pre-exposure than after shorter pre-exposure periods.

This synthesis of an active substance in the seed itself is a metabolic process which is obviously associated in some way or other with aerobic respiration (cf. Botha, Part I, above). Like other metabolic processes it is strongly affected by temperature. At low temperatures it takes place very slowly, but as the temperature rises, its rate increases until an optimum is reached in the vicinity of 35°C. When the seed is pre-exposed at or near to the optimum temperature the stimulant substance accumulates in it at such a rate that a relatively low concentration of the host factor suffices to induce maximal germination. For the same reason maximal germination is also obtained after a relatively short period of pre-exposure at the optimum temperature, while at other temperatures longer periods are required to obtain the same effect.

The phenomenon of spontaneous germination, which I have observed repeatedly in the seed of *A. Vogelii*, is also consistent with this hypothesis. In any seed sample, taken at random, a small amount of seeds has evidently retained the capacity to synthesize the stimulant in quantities sufficient to produce germination. When these seeds are exposed to moist and warm conditions for long enough periods they are consequently able to germinate in the absence of the host factor.

SUMMARY.

1. Three two-factor experiments were carried out to investigate the effect of time of pre-exposure, temperature of pre-exposure and concentration of the host factor on the percentage germination of the seed of *Alectra Vogelii*.

2. As the length of pre-exposure or the concentration of the active substance increases, so does the percentage germination.

3. With a rise in the temperature of pre-exposure the percentage germination steadily increases until an optimum is reached in the vicinity of 35°C.

4. As regards their effect on the percentage germination the interactions between the factors in the following combinations are highly

significant: (a) time of pre-exposure and concentration of the host factor; (b) time of pre-exposure and temperature of pre-exposure; and (c) temperature of pre-exposure and concentration of the host factor.

5. The results obtained are in accordance with the hypothesis that during pre-exposure the seed itself produces an active substance which is the same as or similar to that which originates in the host root.

ACKNOWLEDGEMENTS.

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OBSERVATIONS ON THE ECOLOGY OF THE SOUTH AFRICAN UMBILICARIAE.

By E. A. C. L. E. SCHELPE.

Until recently, only two species of Umbilicaria, *U. papulosa* Ach. var. *rubiginosa* and *U. membranacea* Laurer apud Nyl., were known from South Africa. Subsequent collecting, including that by the author on an expedition to the Central Cedarberg, led to the discovery of many more. These specimens were recently described by Frey (1949) and included four new species.

HABITATS OF THE SOUTH AFRICAN UMBILICARIAE.

The genus Umbilicaria in South Africa appears to be restricted to the mountain ranges in the sub-continent. These saxicolous lichens are usually confined to montane habitats in tropical or sub-tropical regions but may occur at lower altitudes in temperate regions. In South Africa, Umbilicariae have been found on Table Mountain, mountains in the Ceres and Worcester divisions, the Swartberg, the Cedarberg and the Natal Drakensberg. They probably also occur on other mountain ranges in South Africa.

Meteorological records from the summits of these mountains are scant. The mountains in the Cape south-western region occur in the winter rainfall area while the Natal Drakensberg lies within the summer rainfall area. On Table Mountain, the total annual rainfall at the Cableway Station (3,497 ft. alt.) is known to vary between 40 and 50 in.; that at Maclear's Beacon (3,582 ft. alt.) may be over 80 in. Precipitation on and about the summit plateau of Table Mountain is considerably higher than at lower altitudes on the northern or western sides. Furthermore, the summit is often covered by the "tablecloth" cloud.

No records are available for the higher parts of the Cedarberg. The forestry station at Algeria, in the valley below the Middelberg ridge, receives between 19 and 30 in. per annum, but it is probable that the annual rainfall on the peaks is over 40 in. The total annual rainfall on the peaks of the other ranges in the south-western region is probably of the same order. The higher peaks of the inland mountains are frequently bedecked with snow during the winter.

The climate of the higher regions of the Natal Drakensberg is also imperfectly known. The station, Tryme, in the foothills (4,900 ft. alt.) has a total annual rainfall varying between 36 and 77 in., with an average

annual rainfall of 52·57 in. over a period of ten years. The rainfall on the summits is probably higher. Snow usually falls on the summit plateau during the dry winter season and atmospheric temperatures below -10°C . have been recorded near the escarpment edge during July.

TABLE MOUNTAIN.

The most common species of *Umbilicaria* on the Cape Peninsula is *U. papulosa* var. *rubiginosa*. It is frequent on exposed Table Mountain Sandstone faces of various angles of slope. The thalli, which normally bear apothecia, are either grey or red-brown. They are usually small (± 2 cm. diam.) occurring singly or in aggregates of smaller thalli. Groups of the two colour variants appear to be mixed throughout the distribution area of the species on the mountain. The two colour variants do not seem to exhibit any clearly delimited ecological preferences.

U. papulosa var. *rubiginosa* on Table Mountain is confined to the summit and uppermost faces of the massif. (i.e. 3,400—3,580 ft. alt.) Since its area of distribution coincides roughly with that area periodically covered by the "tablecloth" cloud, it seems probable that the distribution of this species is determined by the more or less frequent occurrence of mist, which could provide a supply of water to the thalli, besides that obtained from rain.

A species that apparently demands a much moister environment is *U. dilacerata* Frey, recorded from below Fountain Ledge on a shaded boulder within the spray of a waterfall at 3,000 ft. alt. As Frey (1949) points out, it is remarkable in that very few *Umbilicariae* live under such moist conditions. The thalli bear copious ripe spores, despite the fact that hygrophilous species fruit less frequently with an increasingly wet environment.

MOUNTAINS OF WORCESTER DIVISION.

The Waaihoek mountains provide a habitat for *U. capensis* Frey, *U. cylindrica* (L.) Ach. and *U. polyphylla* Hoffm. f. *lacera* at an altitude of about 5,000 ft. Sandstone substrates are frequent and the higher regions are often snow-covered in winter. *U. cylindrica* and *U. polyphylla* also occur in the sub-alpine and temperate zones of South Island, New Zealand, respectively.

U. membranacea has been recorded in a fruiting condition from above Du Toit's Kloof between the Witteberg and Molenaarsberg at 2,500 ft. alt. on rocks in a streambed which are submerged during floods. Besides its occurrence in this hydric situation it grows on boulders at 2,500 ft. alt. near Somerset West and also on Sneeuwkop at 3,500 ft. alt. on boulders under trees.

SWARTBERG.

The predominantly sandstone peaks of the Swartberg are also inhabited by Umbilicariae. *U. cylindrica* and *U. polyphylla* have been found on the Wagenboomberg at 6,500 ft. alt. Also, a small fragile form of the nitrophilous *U. hirsuta* Ach. em. Frey is recorded from the Kreasberg at 5,000 ft. alt.

CEDARBERG.

The localities in which Umbilicariae occur in the Central Cedarberg appear to be widely scattered. The Umbilicariae in this range attain profusion only above an altitude of 5,900 ft. This may be due to the occurrence of mist which is said to envelop the higher peaks and ridges periodically. The only substrate on which these lichens were found was Table Mountain Sandstone, some of which was more or less quartzitic.

Although the most extensive populations of Umbilicariae were found on the upper sandstone stratum above the "shale band" some of these lichens were seen on the lower sandstone stratum. An isolated population of *U. papulosa* var. *rubiginosa* and *U. hirsuta* was found on sheltered sandstone faces on an outcrop on the eastern side of the Middelberg ridge near the head of Boskloof (4,500 ft. alt.). The outcrop was somewhat shaded by a large Widdringtonia. The thalli of *U. papulosa* var. *rubiginosa* exhibited a colour range from grey to reddish brown and were generally larger than those found on Table Mountain, being about 4 cm. in diameter. Further plants of these two species were found on the outcropping lower sandstone stratum in the vicinity of the Welbedacht Cave (5,000 ft. alt.). Frey (1933) describes *U. hirsuta* as markedly nitrophilous and regards it as a "Charakterflechte" of places where birds roost ("Vogelsitzplatze") in the higher Swiss Alps. However, he also records it from dripping rock faces where, he suggests, it perhaps obtains its minimal nitrogenous requirements from the seepage water. Consequently, it appears that the species can tolerate a low nitrogen supply, although it can utilise greater supplies to advantage. In the Cedarberg localities no great amount of bird droppings was seen above the colonies of the lichen.

The vertical faces of the upper sandstone stratum on the south corner of the Cedarberg Tafelberg (5,900—6,200 ft. alt.) have been colonised by extensive populations of Umbilicariae. The more exposed western face supports less of these lichens. The most luxuriant growth of Umbilicariae was found on large sandstone boulders and the main rock faces of the south-east face of the Tafelberg about the saddle (6,000 ft. alt.) between the Tafelberg and the Spout. The locality is cool and shaded

for the greater part of the day and these rock faces are said to be ice-covered in winter. The most frequent species here is *U. Schelpei* Frey which is mixed with *U. decussata* Zahlb., *U. subglabra* Harms and *U. laevis* var. *Garsidei* Frey. The thalli were noticeably larger (up to 7 cm. diam.) on the sites of periodic water flushes over almost vertical rock faces. Frey (1933) indicates that *U. decussata* and *U. subglabra* are somewhat nitrophilous in Switzerland, and it is not improbable that some nitrogenous material would be washed down such flushes from bird droppings on the summits of the cliffs.

Boulders in deep shade in the large sheltered gully (Gully Route) on the south-eastern corner of the Tafelberg support a sparse population of the light-coloured *U. vellea* Ach. which was not found elsewhere on the mountain. Although this species is hygrophilous in Europe and reaches maximum development of the thalli along seepage lines (Frey 1933, 1949), the Cedarberg locality is hardly very moist for long periods but its cool sheltered situation would expose it to less desiccation than in other parts of the mountain.

The summit plateau of the Cedarberg Tafelberg (6,400 ft. alt.) has been eroded into deep crevices one to five metres deep with the consequent formation of rock bowls with overhanging rims. Extensive areas of closely adjacent rock "mushrooms" also occur on the summit. The shaded vertical walls of these various structures support sparse populations of *U. Bolusiana* Frey, *U. laevis* var. *Garsidei* and *U. papulosa* var. *rubiginosa*. The individual thalli are invariably small (± 2 cm. diam.), a phenomenon probably due to adverse microclimatic conditions. *U. Bolusiana* has also been recorded from the Keeromberg and the Bokkeveld Sneeuwkop at altitudes of about 6,000 ft.

NATAL DRAKENSBERG.

U. haplocarpa is the only species of the genus which has been found on the Drakensberg as yet. The small grey thalli (± 2 cm. diam.), which are usually found bearing apothecia, occur in small scattered populations on east aspect faces of amygdaloidal basalt at 9,800 ft. alt. in the Mont-aux-Sources area. Despite extensive examination of basalt faces below the edge of the summit plateau and of the Cave Sandstone cliffs at lower altitudes, no Umbilicariae were found at altitudes lower than 9,800 ft.

DISCUSSION.

It will be seen from these observations that the known South African species of Umbilicaria are confined to the higher mountain regions which have a fairly high rainfall. With the exception of *U. haplocarpa*, they all occur within the winter rainfall area.

Their distribution indicates that they require a temperate or sub-alpine climate. In South Africa and New Zealand (South Island), *U. cylindrica*, *U. polyphylla* and *U. vellea* are restricted to temperate or sub-alpine mountain environments. *U. vellea*, *U. hirsuta* and *U. haplocarpa* are confined to climatically similar montane habitats in South Africa and South America.

The South African *Umbilicariae* occur on sandstone or quartzitic sandstone substrates, with the exception of *U. haplocarpa* which occurs on Drakensberg amygdaloidal basalt. However, *U. hirsuta* and *U. decussata* are recorded from Popocatepetl on an andesite substrate; *U. vellea* and *U. haplocarpa* have been found on a substrate of Metamorphic rocks in the Nevados de Anconquija in the Argentine (Frey, 1949). *U. hirsuta*, *U. cylindrica* and *U. subglabra* occur on siliceous substrates in France (Hamand, 1909). Frey (1933) records *U. cylindrica* and *U. polyphylla* as members of the *Umbilicarietum hyperboreae* in Switzerland, on granite and gneiss blocks. It may be concluded that some of the species of *Umbilicaria* are able to grow on a wide variety of reasonably stable rock substrates with the exception of calcareous rocks. Consequently it appears that their distribution is affected more by the prevailing micro-climatic conditions than by the nature of the substrate.

Umbilicaria thalli are capable of absorbing moisture from rain and mist and also in the form of water vapour, as has been shown by Scofield and Lawrence (1943). The assimilation rate in *Peltigera* (Ellee, 1939) and the respiration rate in *Parmelia* (Neubauer, 1938) both increase with increasing water content, maxima being obtained in saturated thalli. Although no data are available for *Umbilicaria* thalli it seems probable that the assimilation and respiration rates of thalli of this genus would increase with an increase in water content of the thalli.

Growth of *Umbilicaria* thalli is slow; Fink (1917) estimated that the average annual increase in diameter of thalli of *Umbilicaria pustulata* in Kentucky was 0.36 cm., although higher rates of growth were observed. However, the rate of growth would depend largely upon water supply. Observations on the distribution of these lichens on the Cedarberg Tafelberg indicate that the maximum thallus size of individuals occurs in sheltered positions on the sites of periodic water flushes. In such localities the evaporating power of the atmosphere in the micro-climate would be lower for longer periods than on exposed faces. On Table Mountain, thalli of *U. papulosa* var. *rubiginosa* attain a larger size and are more frequent about the summit plateau, where precipitation is higher and mist more common than at lower altitudes on the same substrate. It is concluded that growth of *Umbilicaria* thalli is favoured by high and frequent

precipitation and infrequent occurrence of very low relative humidities in the micro-climate.

Light intensity is another factor which might affect the rate of thallus growth. At very low light intensities it is possible that specifically characteristic thalli would not be formed. It appears that many of the known South African Umbilicariae are able to tolerate a wide range of light intensities while preserving their characteristic thallus form. Hence, it seems most probable that light intensity is of less importance than water supply and the evaporating power of the atmosphere, in controlling the rate of thallus growth and affecting the distribution of these lichens. This view is in accord with the conclusions reached by Plitt and Pessin (1924) on factors influencing the distribution of some corticolous lichens in Maine.

Bitter (1899) records an increase in the production of isidia by Umbilicaria thalli covered with fallen pine needles. Such increased isidial production may be correlated with increased shade or with increased humidity in the immediate micro-climate of the thalli, or both. These isidia, when detached from the parent thallus, may function as propagules. However, Umbilicaria isidia are frequently devoid of algae (Frey, 1929, 1949) and such isidia consequently cannot effect direct propagation of the thallus. It is not known whether or not there is any correlation between isidial production on one hand and light intensity and water supply on the other, besides the extreme case cited. Fragments of the thallus and various "buds" may be detached from the parent thalli and function as propagules.

The lack of continuous observation of relative humidities and light intensities in the micro-climates prevailing where these lichens occur, precludes any detailed information on the limits of tolerance towards the various factors of the environment shown by different species. However, preliminary observations indicate that, among the species of the South African Umbilicariae, *U. papulosa* var. *rubiginosa* exhibits the widest limits of tolerance to a variation in climatic conditions.

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The author wishes to thank S. Garside, Esq. of Cape Town for enthusiastic encouragement and discussion; also, Prof. R. H. Compton and J. de V. Graaff, Esq. for information on the Cape south-western mountains.

SUMMARY.

The habitats of the known species of the South African Umbilicariae are described. They occur in montane regions with a fairly high rainfall

and with a temperate or sub-alpine climate. Most of the species occur on sandstone substrates. Growth of *Umbilicaria* thalli seems to be favoured by high and frequent water supply by rain and mist, and the infrequent occurrence of low relative humidities in the micro-climate. Light intensity appears to be a factor of less importance.

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REVIEWS.

FLORA OF THE CAPE PENINSULA. Edited by R. S. Adamson, M.A., D.Sc., and T. M. Salter (Capt. (S) R.N. Retd.), Cape Town and Johannesburg. Juta & Co., pp. xx + 890. 55s.

This is the first full-scale local flora to be published in South Africa, and it is fitting that it should concern the area from which came the first South African plants to meet the eyes of botanists—a *Stapelia*, an *Aloe*, a *Haemanthus* and others—the area of the first callers from Europe and of the first European settlement.

Since those early days the Cape Peninsula has received closer botanical study than any other part of the Union, and its wealth of species, and the beauty of many of them, have been a constant source of wonder in view of its limited area. Even now one would hesitate to say that the flora is fully known. Much of the terrain is difficult and the collector needs to be a reasonably active and hardy person. There are still many spots in the mountains which are unvisited by botanists in which—in view of the narrow localisation of many species, and the recency of many discoveries—there may well be new species or new records awaiting the collector. Recent critical study moreover has resulted in better understanding and in the recognition of specific distinctness within groups formerly merely regarded as variable: and much still remains to be done in certain genera. The new Flora will be a stimulus to further work.

The Cape Peninsula flora, perhaps to a greater extent than that of any other part of South Africa, must be regarded as unstable under present conditions. Like many insular floras it contains many local forms and endemics which are peculiarly vulnerable to human interference. A process of extermination has been going on ever since the early settlers exploited the timber and introduced cultivation and grazing, this process having been greatly accelerated in recent years owing to building development, afforestation, flower-picking and the cumulative effects of too frequent fires. This has naturally affected the lower ground most; some of the richest areas such as the lower slopes of Devil's Peak, Green Point Common and the Tokai and Constantia flats, are now almost completely changed; other, such as Wynberg Hill and the Camps Bay slopes are fast losing their native floral wealth. It is only on the mountains and in fortunate areas of special reservation and care such as Kirstenbosch, the Camp Ground and the Cape of Good Hope Nature Reserve, that the flora maintains much of its original richness.

With the disappearance (and the authors, one is glad to note, use the emphatic word extermination) of the indigenous flora has come the invasion of a multitude of aggressive alien weeds: many of them trees and shrubs, favoured in their spread by human agency, such as the Cluster Pine, three species of *Hakea*, half a dozen Australian *Acacias*; others cosmopolitan herbaceous weeds of warm temperate climates, introduced grasses, etc., which have colonised the spaces disturbed by building, road-making and cultivation. The authors have included a considerable number of such aliens as have firmly established themselves.

This Flora then comes at a time which must be regarded as opportune. It records the composition of an amazingly rich piece of the world's vegetation before it has, as someone said, become merely of an anti-quarian interest—a moment which, one fervently hopes, may never arrive: it points out how much has been lost or nearly lost for ever, and how many alien elements have come in, probably for ever. And, in spite of all the evidence of change, it places before the botanist and the general reader a picture of one of the floristic wonders of the world.

The authors of the Flora include no less than 2,622 species of vascular plants, distributed among 702 genera. This is done without undue tendency to splitting, and the number of varieties described is very small. The majority of varieties are distinguished in genera which have received the most careful study (e.g. *Oxalis*) and in the case of alien weeds, where the varieties are, as it were, transferred from their sources overseas. There is little doubt that the great majority of species are "good", with perhaps a tendency to lumping in some cases (e.g. *Sarcocolla*, *Erica mammosa*). Compared with such an intensively studied flora as that of Great Britain, the amount of specific and varietal splitting that has been done is insignificant. In some cases, on the other hand, species that may be separated with fair certainty on the Peninsula tend to lose their distinctness when their mainland representatives are taken into account: (e.g. *Metalasia cephalotes* and *caespitosa*): this perhaps reflecting local isolation among a group of closely related forms, which a wider study will elucidate.

In view of the great difficulties involved and the number of collaborators who have contributed their own special sections to the Flora, one of its remarkable features is the editorial control which has made of it a balanced and uniform work. Individual minor differences of treatment exist, but the contributors have subordinated their work to the general plan in a way that must have been difficult to achieve and which makes the Flora an admirable example of team work.

The Engler system has been followed, and this will perhaps be regretted by some, as its theoretical advantages are questionable, and especially as all three herbaria in the Cape Peninsula use the Bentham-Hooker system, firmly established in South Africa at present by the *Flora Capensis*.

Identification of plants is facilitated throughout by dichotomous keys of a simple type. Unwieldy groups are subdivided into artificial sections for convenience, and the keys themselves reflect practical considerations rather than natural relationships: these are, however, displayed as far as possible in the arrangement of the genera and species themselves.

Perhaps the most striking feature of the book is the fact that it represents new work from beginning to end. The authors have studied the plants and have made their descriptions therefrom, in the majority of cases from fresh material. There has been a minimum of copying from other work, and the result is an authenticity which is worthy of the highest praise. The authors are all resident in the Cape Peninsula and are familiar with its living plants in a way that gives their treatment a value which is so often conspicuously absent from the perfunctory products of certain overseas authorities. While this first-hand knowledge and treatment does not always place the written results beyond criticism and correction, it gives them a realism which herbarium work alone, unless done by a genius, can never achieve. The work entailed has been enormous, but it has been emphatically worth while.

The same local knowledge and personal familiarity with the living plants appears—rather unequally perhaps—in the notes given as to localities, abundance or rarity, seasons and so on. Another welcome feature of the descriptions themselves is the inclusion of notes on flower colour, perfume, hours of opening, stature, etc. This kind of information is of the greatest practical value and interest to the student and amateur, and should always be taken into account by experienced botanists as well, but its absence mars many a Flora.

The accounts of the groups and species are not monographs, and they omit much detail that would be included in a more special treatment. Herbarium specimens are not cited. Synonymy is excluded except in cases where, owing to adherence to international rules of nomenclature, a familiar name (e.g. one used in the *Flora Capensis*) has to be replaced by another. To include such technical matters would be out of place in a local Flora, and would have swelled its already great bulk beyond measure. For the same reason illustrations have been completely excluded—more regrettably, perhaps, as a small sketch has often great practical diagnostic value.

During the compilation of the Flora, a considerable number of new species and varieties were discovered and discriminated, new records and localities for older species were established, and many changes in nomenclature had to be effected. As it is undesirable to publish *novitates* in a general work such as this, the authors have used the opportunities afforded for this purpose by the *Journal of South African Botany* during the last fifteen years.

Citations are not given, but an index to vols. I—XV of this Journal will shortly be published and will enable reference to be made to the full (and often illustrated) original descriptions.

Any criticisms that can be made are relatively insignificant. The less satisfying parts of the book concern the less essential features—the derivation of some of the commemorative generic names where fuller notes would have been acceptable (e.g. *Watsonia*, *Ferraria*, *Willdenowia*, *Lamarckia*)—and the popular names, a considerable number of which can hardly be regarded as current in the Cape Peninsula, others being artificial and many being simply the overseas names of aliens. Misprints are very few (see *Homalanthus*, *Mercurialis*).

The book contains a useful explanatory introduction, a glossary of technical terms, indexes of scientific and popular names, and has a map of the Cape Peninsula for the end-papers.

It is clearly printed with well-chosen types and well bound: in spite of its more than 900 pages it is reasonably light in the hand and opens well. The printers are the Rustica Press, Wynberg.

A cordial welcome should be given to this Flora, an admirable and much needed work, of great practical value to student, mature botanist and intelligent visitor, a sound foundation for further work and an excellent example for future local Floras of South African districts.

R. H. COMPTON.

THE ACTINOMYCETES: Their Nature, Occurrence, Activities and Importance. By Selman A. Waksman, Ph.D. (*Annales Cryptogamici et Phytopathologici*, Vol. 9). Waltham, Mass.: The Chronica Botanica Co. (Johannesburg: Central News Agency, Ltd.) \$5.00.

The Actinomycetes have not received as much attention from investigators as have either the fungi or the true bacteria, largely on account of the great difficulty experienced by the average worker in their identification. However, the recent discovery that some members of the group produce important antibiotics has brought them into prominence, and much valuable information on their morphology, life-cycles and biochemical activities is being published. Professor Waksman's monograph presents the available information with his usual clarity and conciseness.

The book begins with an account of all the systems of terminology which have been used since the first taxonomic description of an Actinomycete was published in 1877. The author discusses the value of ecological, cultural, morphological, biochemical and serological characteristics, and of phage specificity, and comes to the conclusion that morphology is a reasonably reliable basis for classification.

His account of what is known of the metabolism of these organisms leads on to a discussion of their possible future importance as a source of certain enzymes and vitamins, and to a detailed account of their antibiotic properties. A useful classification of the antibiotics produced by these organisms is given, with a description of methods of isolating and testing strains for antibiotic properties, and some detail of the methods used in the manufacture of streptomycin. The phenomenon of autolysis and its importance in streptomycin production is also discussed.

The chapters on the part played by Actinomycetes in natural processes include a fascinating account of their activities in the destruction of pathogenic bacteria in the soil, and a description of their activities as plant pathogens. The final chapter treats of their medical importance.

A worker beginning the study of this group should be considerably helped by the very full descriptions of genera, and by instruction given in culture methods and in the making of microscopic preparations. The book is illustrated with many photomicrographs, some of which are not as clearly reproduced as they might be.

D. L. OLIVIER.

VEGETABLE GUMS AND RESINS. By F. N. Howes. Waltham, Mass.: Chronica Botanica Co. (Johannesburg: Central News Agency), pp. xxii + 188, figs. 42. \$5.00.

From the botanical point of view the gums and resins are perhaps the most interesting of all plant products. In practically all cases they are obtained from wild sources in remote parts of the world, and cultivation rarely enters into the picture: the collectors are mostly primitive people living close to subsistence level and subject to market vagaries and exploitation. In fact the author dedicates this book to "the collectors of gums and resins in all parts of the world, many of whom, especially on the African continent, live in humble circumstances and carry out their work under arduous conditions." Africa is indeed the source of a large proportion of the important gums and resins. Gum Arabic and other *Acacia* gums are outstanding: the Anglo-Egyptian Sudan normally exports more than 20,000 tons annually, and large quantities also come from Senegal, Nigeria and Tanganyika. Among the other important resins Africa produces Congo Copal, East African Copal, West African Copal, Sandarac, Frankincense, and others. The quantity of gum and resin produced in the Union is very small, but Cape Aloe is of special interest.

The natural products hold their own in technology, though synthetic resins are of increasing importance. An interesting development is the production of "copal-type synthetics" in which natural copals are blended

with phenolic and maleic synthetics, the product combining good qualities of both.

The present volume is an admirable compilation of information about the extraordinary number of gums and resins in use, their sources, properties, methods of collection and marketing, utilisation, economics, etc. To the botanist the work is full of interest and surprises. The author, Dr. Howes, is Curator of the Museums of Economic Botany in the Royal Botanic Gardens, Kew, and is specially well equipped for his task by his ability and his surroundings: he has produced a book good both for reading and for reference.

R. H. COMPTON.

THE FIG. By G. I. J. Condit. Waltham, Mass.: Chronica Botanica Co. (Johannesburg: Central News Agency), pp. xviii + 222, figs. 27. \$5.00.

This is a useful summary, with full bibliography, of the cultivated fig, its history, botanical features, varieties, fruit characters, caprification, breeding, cultivation, districts and climatology, culture, cropping, diseases and pests, marketing, products, chemistry, etc. It is well worth study in South Africa, where fig culture—especially that of the Smyrna type—surely deserves more attention than it is given at present.

R. H. COMPTON.

WATER IN THE PHYSIOLOGY OF PLANTS. By A. S. Crafts, H. B. Currier and C. R. Stocking. 240 pages; 1949; price \$6.00; published by the Chronica Botanica Company, Waltham, Mass., U.S.A. Johannesburg: Central News Agency.

It is unfortunate that this authoritative monograph makes such heavy reading. This is especially true of the first two chapters on the structure of water and on the properties of solutions. However, after the first two chapters, this book becomes more readable, although, like many monographs, it never becomes what could be termed easy reading. But then the problems with which it deals are very complex.

In their chapter on the mechanism of osmosis, the authors introduce the new standard terminology now in use in the U.S.A. This will remove a great deal of misunderstanding that has existed, owing to the multiplicity of terms in use. Suction Pressure is now written as D.P.D. (Diffusion Pressure Deficit); Osmotic Pressure is now defined as the full potential maximum turgor pressure which can develop in a system in a state of equilibrium, and so on. While some of these terms may not be in common use here, their value as standard terms is readily appreciated.

The sections of the book dealing with water as a plant component, the osmotic qualities of plant cells and active water relations, are very clear indeed. In these chapters the criticism of methods used in experimental techniques is very good and the summaries are of the same high standard. These are undoubtedly the best chapters in the book.

A book of this type must be of great interest to South African botanists as water plays such a dominant part in the limiting of growth in this country. Perhaps the most important observation from our point of view made by the authors is the following:

"Though plant exploration may find plants better able to survive drought, and hybridization may result in plants with more extensive root systems, it seems that the most promise [of cultivating drought-ridden areas] lies in the possibility of conserving and utilizing our existing supplies of water more fully". Plants cannot be bred for all types of drought conditions. However, drought-resistant plants can be successfully bred, within limits. Investigation of the rôle played by bound-water in drought resistance are clearly worth more research, as are researches into the part played by colloids in these drought-resistant plants. These would enable us to recognise what special characteristics must be looked for in drought-resistant plants. Only when these characteristics are clearly understood can the geneticists endeavour to introduce them into new hybrids.

A book covering such a vast field cannot be accurate on all points, yet the errors in this book are remarkable for their scarcity. There is, however, one passage which is rather surprising. It is in the section dealing with translocation of substances in the phloem. The authors try to explain this by suggesting that the mechanism is probably a mass flow "along a hydrostatic gradient developed osmotically", while protoplasmic streaming is not considered as probable. Surely the reverse is the case?

The most useful feature of the *Chronica Botanica* publications is their bibliography. This book is quite up to the usual standard, as there are eighteen pages of bibliography. It is a book which every physiologist should try to obtain for his reference library.

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A REVISION OF AGATHOSMA

BY N. S. PILLANS.

The genus *Agathosma* is endemic in South Africa and is confined to areas of the Cape Flora in the Cape Province, Natal and Basutoland. The greatest concentration of species is in the south-western part of the Cape Province where the distribution extends from the coast to the tops of the highest mountains. Very few extend eastward into the region of summer rainfall. One of these, with great variation in size and shape of leaves, has a range of distribution on the mountains from Worcester to Maritzburg. Many species are restricted to certain soils, altitudes, aspects and conditions of dryness and moisture. For examples, those on calcareous soil at the coast, on sandy coastal flats, swampy soil, margins of streams, on rocky ledges or in rock-crevices.

The usual habit is of a much branched shrublet, few species reaching the height of 2 metres. Hairs are generally present on the branchlets, and are usually more or less reflexed, and often confined to longitudinal strips alternating with glabrous strips at the bases of the leaves. Conversely, on glabrous branchlets there are hairy strips at the bases of the leaves. These characters are not always constant in a species, the strips not always being apparent. The leaves in many species arise at the upper ends of raised strips with which they are articulated, and so appear to have a decurrent petiole. The petiole is usually short, narrow and slightly compressed, rarely with any conspicuous character. When the leaves vary considerably in size, the shorter are often relatively wider than the longer, and the base of the blade is usually blunter. The larger type of leaf usually has a slightly convex, flat or slightly concave upper surface. The smaller almost ericoid leaf is usually quite distinctly concave above. The margins are rarely closely involute or revolute. Glands may occur on the branchlets, leaves, calyx, petals, anthers,

staminodes and ovary. They may be sunken or partly raised, stalked or at the ends of hairs.

The flowers of most species are in terminal clusters often resembling a capitulum. The outer and lower flowers of a cluster sometimes arise in the axils of leaves, so that terminal and axillary flowers are present on the same plant. Species with only axillary flowers are relatively few. Flowers are rarely produced at the ends of short leaflets or bracteate branchlets. In only two species are the flower clusters situated in a lateral position or at the forking of the stems. The size and shape of the petals is often variable to a considerable extent, but they usually have useful characters for the purpose of classification. The filaments of the stamens are frequently unequal in length. Anthers often have a gland at the apex of the connective. Staminodes, though variable in some species, have many useful characters. The petaloid type of staminode is present mostly in flowers with an ovary of 3 carpels. The disk varies little in shape, and rarely has any remarkable character. It is seldom described. The fluted shape of the outer surface is the result of pressure by the filaments during early stages of development. Sterile flowers with a partly developed gynoeceium are very frequent. All the flowers, with or without exception, in an inflorescence may be imperfect in respect of the gynoeceium. Some species produce comparatively few perfect flowers.

Hitherto little attention has been given to the structure of the ovary as providing characters for taxonomic purposes. It is now evident that the structure of the ovary is the best guide to the natural relationships between the species, as well as indicating one of the trends of evolution in the genus. The number of carpels varies from 1—5. In all species there is a certain predominating number. When there are exceptions the numbers are mostly less, rarely greater, than the usual number. Species with the same number of carpels are not necessarily related. In most species the usual number is 3. Ovaries with 5 carpels are usually correlated with the largest most expanded leaves and axillary flowers, probably the oldest characters in the genus. Ovaries with fewer carpels are associated with narrower, concave and a more ericoid type of leaves, and with flowers in terminal clusters. Most of the longitudinal development of the ovary is in the upper half, about the apex. A mature ovary with the upper half entirely hairy may, in a younger state, have been hairy only on or around the apex. The reduction in the number of carpels is the most remarkable feature of the ovary of *Agathosma*. The author has found that a similar reduction is a common feature also in the genus *Phyllica* and the families *Bruniaceae* and *Restionaceae*, where there is evidence also of a tendency to reduce the number and size and to discard

some or all the parts of the perianth. It is an interesting fact that species of *Agathosma* with the most primitive characters and species with the most advanced characters occur in the Clanwilliam Division.

There are several fairly natural groups of species with similarity in leaf and floral characters. But these groups are connected through other species and cannot be isolated satisfactorily. Though many species have been merged with others of earlier date, there probably are some of those maintained in this work which will have to be reduced to synonyms when further material shows the necessity of widening the scope of certain species. Hitherto undue importance has been given to some characters which now seem to have little or no importance, because of great variability.

Several previous workers have suggested that *Agathosma* and *Barosma* should be united. The chief characters which were used in separating these genera are in the arrangement of the leaves and the position of the flowers. But such of the characters as were used are not always constantly associated. For instance, the arrangement of the leaves in a species may have all the possibilities existing in both genera, opposite leaves may be accompanied by flowers in terminal clusters, and alternate leaves may be accompanied by axillary flowers. The result was that some species could not be placed in either genus satisfactorily. Because of those facts, the two genera are now united, preference being given to *Agathosma*, much the larger, so as to minimize changes in nomenclature.

All previous descriptions of the genus and species have been revised and mostly amplified, in order to widen the scope of many species and to include such characters as are regarded important in the present treatment. All varieties have been merged with the species, for the reason that they are all connected with the species through intermediate forms. Measurements of the leaves include the petiole. Measurements of floral parts are taken from fully developed flowers. The calyx-tube rarely has any important character, and is seldom mentioned. All the collections recorded in this work have been examined, unless otherwise stated, and only dried material has been used. A mark of exclamation (!) denotes that the type or a cotype has been seen. Localities are grouped under political divisions arranged in alphabetical order. The actual specimens used by Ecklon and Zeyher as types of their many species have not been traced, but most of their species are represented by cotypes in Sonder's collection in the Riksmuseet, Stockholm. These were received on loan in the Bolus Herbarium together with over 2,700 sheets from other institutions.

Grateful acknowledgment has to be made of the loan of herbarium material from the following institutions:—Albany Museum, Grahams-

town; Botanical Museum, Lund; Natal Herbarium, Durban; National Botanic Gardens, Kirstenbosch; National Herbarium, Pretoria; Riksmuseet, Stockholm; Royal Botanic Gardens, Kew; and South African Museum, Cape Town.

AGATHOSMA, Willd. *Enum. Hort. Berol.* 259 (1809); *Bartl. and Wendl. f. Diosm.* 121 (1824); *DC. Prodr.* i, 714 (1824); *Harv. Gen.* 50 (1838); *Endl. Gen.* 1158, no. 6021 (1840); *Sond. in Harv. and Sond. Fl. Cap.* i, 390 (1860); *Benth. and Hook. f. Gen. Pl.* i, 290 (1863); *Harv. Gen.* ed. 2, p. 44 (1868); *Baillon, Nat. Hist. Pl.* iv, 465 (1875); *Engl. and Prantl, Pflanzenfam.* iii, §4, 149 (1897); *Thonner, Fl. Pl. Afr.* 296 (1915); *Marloth, Fl. S. Afr.* i, §2, p. 106 (1925); *Phillips, Gen. S. Afr. Fl. Pl.* 351 (1926); *Levy's, Guide to Flora of Cape Peninsula* 163 (1929); *Walgate in Fl. Cape Peninsula* 539 (1950). **Hartogia** Linn. *Syst.* ed. 10, p. 939 (1759); *O. Kuntze, Rev. Gen.* i, 100 (1891). **Diosmae** spp. Linn., Thunb., Lam., DC. etc. **Parapetalifera** *Wendl. Collect. Bot.* i, 15, 34 (1808). **Bucco** *Wendl. op cit.* 13, t. 2; *Roem. and Schultes, Syst. Veg.* v, 438 (1819). **Barosma** Willd. *Enum. Hort. Berol.* 257 (1809); *Bartl. and Wendl. f. Diosm.* 94; *DC. Prodr.* i, 714; *Jussieu in Mem. Mus. Paris* xii, 474 (1825); *Hook. in Curt. Bot. Mag.* 3413 (1835); *Endl. Gen.* 1158, no. 6020; *Harv. Gen. S. Afr. Pl.* 50; *Sond. in Harv. and Sond. Fl. Cap.* i, 392; *Benth. and Hook. f. Gen. Pl.* i, 290; *Harv. Gen. S. Afr. Pl.* ed. 2, p. 44; *Baillon, Nat. Hist. Pl.* iv, 465; *Engl. and Prantl, Pflanzenfam.* iii, §4, p. 148; *Sim, Forest Fl. of Cape Colony* 154 (1907); *Thonner, Fl. Pl. Afr.* 296; *Marloth, Fl. S. Afr.* ii, §1, p. 105; *Phillips, Gen. S. Afr. Fl. Pl.* 351; *Levy's, Guide to Flora of Cape Peninsula* 163; *Esterhuysen in Fl. Cape Peninsula* 538 (1950). **Baryosma** *Roem. and Schultes, Syst. Veg.* v, 448 (1819). **Dichosma** DC. *ex Loud. Hort. Brit.* 85 (1830). **Gymnonychium** *Bartl. in Linnaea* xvii, 354, t. 11 (1843).

Shrubs or undershrubs with ascending or rarely decumbent woody stems. Leaves opposite, ternate, quaternate, alternate or scattered, often crowded, sometimes imbricate, ascending, spreading or reflexed, entire or gland-crenate, shortly petiolate, linear, lanceolate, oblanceolate, oblong, elliptic, ovate, obovate, cordate or rotund, cuneate, rounded or cordate at the base, concave, convex or flat above, often with prominent nerves or keeled beneath; coriaceous, smooth, tubercled or with raised glands, usually \pm conspicuously gland-dotted beneath, glabrous or \pm hairy. Stipules none. Flowers bisexual or unisexual (gynoecium imperfectly developed), pedunculate or very rarely sessile, mostly in terminal clusters, often solitary or few together in the axils of the upper leaves. Bracteoles 2, usually arising on the peduncle, or none. Calyx 5-parted, often with the segments uneven in size and shape. Petals 5, very rarely

up to 8, hypogynous, imbricate in aestivation, sessile or clawed at the base, usually \pm gland-dotted beneath. Stamens 5, free, at the base of the disk, with terete or compressed filaments. Anthers 2-celled, introrse, the connective usually with a terminal gland. Staminodes opposite the petals, usually narrow, dorsally compressed, often petaloid, usually with a gland at or behind the apex, rarely adnate to the base of the petals. Disk cup-shaped, crenulate, rarely toothed or lobed, usually clasping or often completely enveloping the ovary. Ovary superior, of 1—5 almost free carpels with or rarely without a process on or near the apex of the dorsal angle, and with 2 superimposed or collateral axile ovules. Style elongated, with a simple or subcapitate stigma. Fruit capsular, with 1—5 one-seeded cocci, the inner and outer walls separating at maturity. Seeds oblong or pyriform, with peripheric endosperm, and with a plane surface on one side of the base against which the aborted ovule is appressed.

KEY TO THE SPECIES.

- *Carpels usually 5:
 - †Staminodes distinctly widest above the middle:
 - ‡Carpels without processes:
 - Sepals lanceolate or ovate-lanceolate (21) *microcarpa*
 - Sepals ovate- obovate- or elliptic-oblong (20) *foetidissima*
 - ‡‡Carpels with processes:
 - Leaves cordate or reniform (22) *cordifolia*
 - Leaves neither cordate nor reniform:
 - §Petals with a claw distinctly as long or longer than the blade:
 - Processes on the ovary obovate (95) *conferta*
 - Processes on the ovary oblong (15) *pentachotoma*
 - §§Petals without a distinct claw or with a claw shorter than the blade:
 - Petals with a slender claw almost as long as the blade (16) *rubricaulis*
 - Petals cuneate in the lower half or at the base:
 - Processes on the ovary \pm clavate:
 - Leaves alternate, mostly widest above the middle (9) *craspedota*
 - Leaves opposite, widest at or below the middle (7) *namaquensis*
 - Processes on the ovary oblong, rotund or transversely oblong:
 - Flowers in terminal clusters (23) *decurrens*
 - Flowers on short bracteate axillary stipes (4) *ovata*
 - ††Staminodes not distinctly widest above the middle:
 - ‡Staminodes oblong:
 - §Sepals oblong or elliptic-oblong:
 - Leaves 0.3—0.5 cm. long, concave above (10) *Phillipsii*
 - Leaves 0.5—1.4 cm. long, slightly concave, flat or slightly convex above (11) *Marlothii*
 - §§Sepals ovate, deltoid-ovate, lanceolate or ovate-lanceolate:
 - Processes on the ovary conical (13) *Pattisoniae*
 - Processes on the ovary not conical:
 - Processes elliptic, obovate or orbicular:
 - Leaves with closely revolute margins (24) *subteretifolia*
 - Leaves not as above (1) *Bathii*

- Processes linear, oblong or transversely oblong:
 Processes transversely oblong (25) *stipitata*
 Processes linear, oblong or linear-oblong:
 Leaves mostly 1—1.5 cm., rarely 0.5 cm.
 long (4) *ovata*
 Leaves mostly 0.6—1 cm. long (14) *Rehmanniana*
- ††Staminodes linear, lanceolate, linear-lanceolate, fusiform or oblong-elliptic:
 §Carpels without processes or, at most, umbonate on the dorsal angle:
 Flowers axillary (106) *microcalyx*
 Flowers in terminal clusters:
 Staminodes 2 mm. long, oblong-fusiform, pubescent beneath, with a long-stalked apical gland (12) *Acocksii*
 Staminodes 4.5—5 mm. long, linear, pilose beneath, with a large crateriform apical gland (8) *adenandriiflora*
- §§Carpels with distinct processes:
 ||Processes oblong:
 Sepals reflexed during the flowering period . . (11) *Marlothii*
 Sepals not reflexed:
 Leaves ± concave above:
 Petals oblong- or elliptic-ovate; stamens glabrous; staminodes oblong-elliptic; processes on the ovary somewhat lobed; style glabrous (19) *spinescens*
 Petals obovate or elliptic-obovate; stamens puberulous on the filaments; staminodes linear-lanceolate; processes on the ovary entire; style pubescent (26) *zwartbergense*
 Leaves ± convex or flat above:
 Leaves with glands confined to the margin . . (17) *Barnesia*
 Leaves not as above (4) *ovata*
- |||Processes obovate or rotund:
 Processes obovate:
 Petals 0.6—0.7 cm. long, obovate (3) *distans*
 Petals 1—1.5 cm. long, ovate-lanceolate (2) *insignis*
 Processes rotund or obovate-rotund:
 Staminodes linear (18) *divaricata*
 Staminodes lanceolate:
 Leaves linear; petals 2.25—3 mm. long . . (20) *foetidissima*
 Leaves wider; petals 0.7—1 cm. long:
 Leaves widest in the lower half; processes on the ovary ovate-rotund (5) *crenulata*
 Leaves widest in the upper half; processes on the ovary obovate-rotund (6) *betulina*
- **Carpels usually 4:
 †Petals cuneate or rounded at the base, without a distinct claw:
 Leaves with glands scattered on the lower face . . (28) *purpurea*
 Leaves with glands confined to the margin:
 Ovary glabrous (47) *odoratissima*
 Ovary pubescent and pilose (29) *hirsuta*
- ††Petals with a distinct claw at the base:
 Petals 4.5 mm. long; ovary distinctly stipitate . . (27) *tabularis*
 Petals 2.5 mm. long; ovary not distinctly stipitate . . (30) *Bodkinii*
- ***Carpels usually 3:
 †Bracteoles not arising on the peduncle:
 ‡Leaves mucronate:
 §Processes on the ovary oblong:
 Leaves with glands usually confined to the margin (32) *acutissima*

- Leaves with glands not confined to the margin.. (31) *puberula*
- §§Processes on the ovary rotund, eventually elongating:
- ||Glands on the lower face of the leaves, except the margin, arranged in 2—6 rows:
- Sepals widely oblong or widely obovate, widely membranous at the margin (33) *mucronulata*
- Sepals oblong or oblong-lanceolate, not widely membranous at the margin (35) *Martiana*
- |||Glands on the lower face of the leaves mostly at or confined to the margin:
- Sepals oblong or distinctly widest above the middle (37) *pilifera*
- Sepals lanceolate or ovate-lanceolate (41) *apiculata*
- ††Leaves not mucronate:
- Leaves distinctly widest above the middle .. (43) *fraudulenta*
- Leaves not as above:
- Sepals linear-spathulate (48) *Sladeniana*
- Sepals oblong, ovate or lanceolate:
- Processes on the ovary widely spathulate .. (49) *mirabilis*
- Processes on the ovary oblong:
- Staminodes linear-subulate (50) *pulchella*
- Staminodes lanceolate:
- Sepals linear-lanceolate, attenuate; petals tapering to a wide base (51) *stenosepala*
- Sepals ovate-lanceolate; petals with a distinct claw $\frac{2}{3}$ as long as the blade.. (52) *glandulosa*
- ††Bracteoles arising on the peduncle, sometimes rudimentary:
- ‡Staminodes resembling the petals but with a narrower blade:
- Sepals \pm pubescent above (53) *anomala*
- Sepals not pubescent above:
- Bracteoles arising at or near the apex of the peduncle; style partly pilose (63) *aemula*
- Bracteoles arising on the lower half of the peduncle:
- Leaves rough with papillae beneath (64) *scaberula*
- Leaves not as above:
- Leaves with a stout keel, very conspicuously gibbous behind the apex, ciliate with coarse rigid hairs (66) *eriantha*
- Leaves not as above, but sometimes ciliate with thin flexible hairs (55) *bifida*
- ††Staminodes not resembling the petals:
- §Leaves convex, flat or slightly concave above, or if not distinctly so then spreading or reflexed:
- ||Petals less than 3 mm. long:
- Leaves at first minutely puberulous; petals without a distinct claw (37) *pilifera*
- Leaves glabrous; petals with a claw half as long as the blade:
- Leaves elliptic or ovate (70) *minuta*
- Leaves cordate, rotund or widely ovate .. (71) *orbicularis*
- |||Petals at least 3 mm. long:
- Petals with a claw twice as long as the blade.. (115) *imbricata*
- Petals with a claw less than twice as long as the blade:
- ¶Petals with a claw $\frac{1}{4}$ — $\frac{1}{2}$ as long as the blade:
- Leaves distinctly nerve-gibbous behind the apex:
- Leaves elliptic-oblong, oblong- or ovate-lanceolate (72) *Dielsiana*

- Leaves oblong-lanceolate, ovate, rotund or orbicular:
- Petals with a claw $\frac{1}{2}$ as long as the blade; staminodes linear, attenuate at both ends; ovary with rotund processes. (73) *Muirii*
- Petals with a claw $\frac{1}{4}$ as long as the blade; staminodes narrowly linear near the base, lanceolate upwards; ovary with obovate-oblong processes (74) *riversdalensis*
- Leaves not distinctly gibbous behind the apex:
- Flowers in terminal clusters (77) *florida*
- Flowers in axillary clusters (78) *venusta*
- ¶ Petals with a claw at least half as long as the blade:
- × Staminodes distinctly widest in the uppermost third of their length:
- Leaves mostly 4—6 mm. long, oblong-elliptic, elliptic, ovate or subrotund (82) *lanceolata*
- Leaves 3·5—4 mm. long, obovate, obovate-oblong or rotund (79) *thymifolia*
- × × Staminodes widest at or below the middle:
- Leaves with a pilose margin closely revolute to a prominent pilose nerve (67) *serpyllacea*
- Leaves not as above:
- + Leaves with hairs confined to the margin and nerve:
- Leaves erect-spreading or spreading (68) *Cerefolium*
- Leaves reflexed or spreading:
- Leaves usually 2·5—3 mm. long, oblong- or ovate-lanceolate, or ovate, obtuse; staminodes lanceolate, cuneate at the base (76) *latipetala*
- Leaves usually 4—5 mm. long, lanceolate, acute or subacute; staminodes lanceolate in the upper half, tapering from the middle to the base (83) *trichocarpa*
- + + Leaves with hairs not confined to the margin and nerve:
- Leaves very much reflexed (85) *marifolia*
- Leaves not much reflexed. (68) *Cerefolium*
- §§ Leaves usually distinctly concave or furrowed above, mostly erect-spreading or ascending, sometimes spreading:
- || Leaves mostly widest at or above the middle or linear or oblong and not distinctly widest in any part:
- ¶ Staminodes widest above the middle:
- × Staminodes partly adnate to the petals:
- Leaves pectinate-ciliate with rigid closely set hairs; sepals spatulate-oblong (87) *Foleyana*
- Leaves and sepals not as above:
- Leaves at first pilose beneath, often subpersistently so; bracteoles at the apex or on the upper half of the peduncle; petals with an ovate blade; ovary densely pilose (91) *concava*

- Leaves glabrous or at most setaceo-pubescent beneath; bracteoles at the middle of the peduncle; petals with an obovate blade; ovary glabrous, or sparsely setose on the processes (89) *alticola*
- × × Stamnodes free:
- + Petals with a claw almost $2\frac{1}{2}$ —3 times as long as the blade:
- Flowers surrounded by widened leaves with scarious margins (98) *Hookeri*
- Flowers not surrounded by widened leaves (124) *bicolor*
- + + Petals with a claw shorter than to twice as long as the blade:
- Leaves conspicuously swollen behind the apex (97) *gonaquensis*
- Leaves not, or sometimes slightly, swollen behind the apex:
- Flowers accompanied by wide scarious usually brown bracts . . (90) *alpina*
- Flowers not accompanied by such bracts:
- Sepals with closely set long cilia . . (96) *Peglerae*
- Sepals at most ciliate or sparsely ciliate:
- Petals with a claw $\frac{1}{2}$ — $\frac{3}{4}$ as long as the blade (75) *pallens*
- Petals with a claw as long to twice as long as the blade . . (107) *bisulca*
- ¶¶ Stamnodes not widest above the middle:
- × Leaves narrowly elliptic, narrowly ovate or distinctly widest above the middle:
- Bracteoles on the lower half of the peduncle (86) *elata*
- Bracteoles on the upper half of the peduncle:
- Leaves 1.5—2 mm. long, closely imbricate, almost as wide as long; petals with a claw almost twice as long as the blade (99) *squamosa*
- Leaves 2—3 mm. long, loosely imbricate, much narrower in proportion to the length; petals with a claw $\frac{2}{3}$ as long as the blade (88) *cedrimontana*
- × × Leaves linear, oblong, linear- or elliptic-oblong, sometimes slightly widened towards the base or apex:
- + Leaves pilose-ciliate:
- Leaves navicular, keeled, pilose only at the margin and on the keel; petals 6 mm. long (110) *sedifolia*
- Leaves neither navicular nor keeled, at first entirely pilose beneath; petals 3 mm. long (90) *alpina*
- + + Leaves not pilose-ciliate:
- Leaves persistently hispid; sepals lanceolate or ovate-lanceolate:
- Leaves with 4 rows of glands beneath; petals with a claw $1\frac{1}{2}$ times as long as the blade (100) *hispida*
- Leaves not as above; petals with a claw $\frac{1}{2}$ as long as the blade . . (103) *capensis*

- Leaves glabrous or \pm hispid, usually becoming glabrous; sepals ovate or detoid-ovate:
- Ovary with subquadrate retuse processes (106) *microcalyx*
 - Ovary with oblong obtuse processes:
 - Leaves very obtuse, usually rather fleshy (109) *crassifolia*
 - Leaves obtuse, subacute or acute, not at all fleshy (108) *giftbergensis*
- |||Leaves mostly widest below the middle:
- ¶Petals with a claw 2—3 times as long as the blade:
 - Leaves dorsally compressed, much greater in width than in depth (115) *imbricata*
 - Leaves not as above:
 - Leaves not rough with tubercles or glands on the entire lower face (111) *lancifolia*
 - Leaves rough with tubercles or glands on the entire lower face:
 - Leaves cordate or subcordate at the base; petals with a claw 3 times as long as the blade (118) *asperifolia*
 - Leaves rounded or shortly tapered at the base; petals with a claw 2—2½ times as long as the blade:
 - Petals with a widely ovate blade (122) *gnidiiflora*
 - Petals with an obovate or oblanceolate blade:
 - Leaves rounded and with large glands beneath, closely involute at the margin (123) *krakadouwensis*
 - Leaves \pm keeled and with small glands beneath, not closely involute at the margin (124) *bicolor*
- ¶¶Petals with a claw less than twice as long as the blade:
- × Inflorescences lateral or at the forking of the stems:
 - Branchlets pubescent; leaves pilose at the margin and on the keel; peduncles subtended by bracteoles (120) *leptospermoides*
 - Branchlets puberulous; leaves at first minutely glandular-puberulous beneath; peduncles with bracteoles at the middle (121) *roodebergensis*
 - × × Inflorescences at the ends of the branchlets:
 - + Flower-clusters with conspicuous scarious involucreal leaves:
 - Leaves not distinctly thickened at the margin (126) *cephalodes*
 - Leaves distinctly thickened at the margin:
 - Sepals linear-oblong, pilose at the apex; ovary hispid on the apex (127) *involverata*
 - Sepals lanceolate, not pilose on the apex; ovary glabrous (128) *sabulosa*
 - + + Flower-clusters without scarious involucreal leaves:
 - Sepals with a prominent keel decurrent on the calyx-tube:
 - Peduncles puberulous; calyx tuberculate-scabrid, with short glandu-

- lar hairs; staminodes linear-oblong at the middle, tapering to a slender apex, ciliate in the lower half (129) *affinis*
- Peduncles glabrous or sparsely pilose; calyx neither tuberculate-scabrid nor with glandular hairs; staminodes not tapering to a slender apex, villous at the middle . . (130) *hirta*
- ○ Sepals not as above:
- △ Leaves navicular, not greater in width than in depth at the base:
- Petals with a claw shorter than the blade:
- Leaves linear-lanceolate, acute; staminodes 1.5 mm. long, linear-oblancoolate, attenuate (112) *Joubertiana*
- Leaves lanceolate-oblong, obtuse; staminodes 2.5 mm. long, oblong-linear, slightly widened in the lower half . . (113) *florulenta*
- □ Petals with a claw as long as or longer than the blade:
- Ovary without processes . . (119) *salina*
- Ovary with processes:
- Leaves pilose at the margin and on the keel; ovary pilose on the apex . . (101) *capitata*
- Leaves not pilose at the margin or on the keel; ovary glabrous (102) *collina*
- △ △ Leaves not navicular, greater in width than in depth at the base:
- Leaves with the nerve swollen behind the apex:
- Leaves straight or \pm incurved in the upper half:
- Leaves ovate; bracteoles basal; staminodes geniculate at the middle; ovary with obovate processes . . (114) *geniculata*
- Leaves narrower; bracteoles not basal; staminodes not geniculate; ovary with oblong processes:
- Leaves with stalked glands on the margins; peduncles and sepals with stalked glands (67a) *propinqua*
- Leaves, peduncles and sepals not as above . . (67) *serpyllacea*
- Leaves \pm recurved in the upper half:
- Staminodes 1.75—3.25 mm. long; ovary with rotund or widely obovate processes (68) *Cerefolium*
- Staminodes 3.5—4.5 mm. long; ovary with oblong or obovate processes . . (81) *ciliaris*
- □ Leaves with the nerve not distinctly swollen behind the apex:

- Ovary with rotund processes:
 Branchlets resinous; sepals
 1.5 mm. long, ovate or
 elliptic-oblong (117) *alaris*
 Branchlets not resinous; sepals
 0.5—0.75 mm. long, ro-
 tund (70) *minuta*
- Ovary with oblong or obovate
 processes:
 Stamines mostly linear, ta-
 pering in the lower half,
 with a conspicuous gland
 behind the apex . . . (116) *juniperifolia*
 Stamines mostly widest in
 the lower half, with a
 small gland on the apex . . (103) *capensis*
- ****Carpels usually 2:
 †Bracteoles not arising on the peduncle:
 ‡Leaves with a distinctly thickened, cartilaginous and
 smooth margin without glands:
 Sepals distinctly mucronate (36) *spinosa*
 Sepals not mucronate:
 Leaves with a recurved mucronate apex . . (42) *recurvifolia*
 Leaves neither recurved nor mucronate at the
 apex (44) *planifolia*
- ‡‡Leaves not as above:
 Leaves distinctly incurved, usually with stalked
 glands on the margin (40) *blaerioides*
 Leaves not as above:
 Leaves with a distinct, sharp and spreading mu-
 cro (34) *pungens*
 Leaves not as above;
 §Leaves slightly recurved:
 Leaves with glands scattered on the lower
 face; stamines linear (45) *ovalifolia*
 Leaves with glands confined to the margin;
 stamines oblong-lanceolate (46) *clavispala*
- §§Leaves not recurved:
 Flowers 1 or 2 together in the axils of the
 upper leaves:
 Branchlets densely villous; flowers solitary (134) *umbonata*
 Branchlets puberulous; flowers in pairs . . (132) *kougaense*
 Flowers many together in terminal or axil-
 lary clusters:
 Leaves mostly widest below the middle,
 often subcordate (39) *elegans*
 Leaves mostly widest at or above the mid-
 dle (38) *Mundtii*
- ††Bracteoles arising on the peduncle, sometimes vestigial:
 ‡Stamines resembling the petals:
 Petals lanceolate or ovate-lanceolate . . (54) *Dregeana*
 Petals distinctly widest above the middle:
 Leaves flat, slightly concave or slightly convex
 above:
 Petals with an oblanceolate-linear blade . . (56) *stenopetala*
 Petals with an obovate or oblong-elliptic blade (57) *linifolia*
 Leaves distinctly concave above:
 Leaves distinctly pilose-ciliate (59) *tulbaghensis*
 Leaves glabrous or sometimes at first ciliate . . (58) *virgata*
- ‡‡Stamines not resembling the petals:
 §Stamines partly adnate to the petals:
 Leaves linear, with closely involute margins . . (60) *Esterhuyseniae*

- Leaves wider, not involute at the margin:
 Bracteoles arising on the upper half of the peduncle; sepals very obtuse (93) *adnata*
 Bracteoles arising on the lower half of the peduncle; sepals not very obtuse (94) *humilis*
- §§Staminodes free:
 Petals with a claw 3 times as long as the blade (125) *longicornu*
 Petals with a claw at most twice as long as the blade:
 Petals oblanceolate (69) *bicornuta*
 Petals consisting of a distinct blade and claw:
 Staminodes widest in the lower half (103) *capensis*
 Staminodes widest in the upper half, or at least as wide as in the lower half:
 Ovary with rotund processes:
 Petals with a claw as long as or almost as long as the blade (104) *glabrata*
 Petals with a claw from as long to twice as long as the blade (107) *bisulca*
 Ovary with oblong or obovate processes:
 ||Petals with a claw half as long as the blade:
 Peduncles glabrous, with ciliate bracteoles on the lower half (84) *abrupta*
 Peduncles pilose, with pilose bracteoles on the upper half (62) *Stokoei*
 ||||Petals with a claw up to $1\frac{1}{2}$ times as long as the blade:
 Sepals with a conspicuously wide membranous margin (105) *corymbosa*
 Sepals not as above:
 Leaves slightly concave, flat or slightly convex above (80) *ciliata*
 Leaves distinctly concave above, incurved at the apex, distinctly swollen behind the apex (65) *robusta*
- ****Carpels usually 1:
 Flowers axillary (133) *unicarpellata*
 Flowers in terminal clusters:
 Leaves 5—8 mm. long; peduncles exceeding 2 mm. in length; sepals oblong or ovate-lanceolate (61) *pubigera*
 Leaves 2—5 mm. long; peduncles not exceeding 1 mm. in length; sepals spatulate, obovate or obovate-oblong:
 Leaves ovate or lanceolate-ovate; petals with a claw $1\frac{1}{2}$ —2 times as long as the blade (92) *stilbeoides*
 Leaves cordate or orbicular; petals with a claw $\frac{1}{2}$ as long as the blade (131) *dentata*

1. **A. Bathii** comb. nov. **Barosma Bathii** Dümmer in *Ann. Bolus Herb.* iii, 1 (1920)!

Branchlets pubescent or puberulous. Leaves 1.5—3 cm. long, opposite or alternate, erect-spreading, elliptic, obovate- or ovate-elliptic, obtuse, rounded or widely cuneate at the base, flat or almost so, sparsely warted above, coarsely crenulate, glabrous or sparsely pubescent above and beneath, with a prominent median nerve and many secondary nerves, with large marginal glands and many smaller glands scattered beneath.

Flowers 2 or 3 together at the ends of short axillary forked branchlets bearing much reduced leaves or without leaves. Peduncles 2 mm. long, puberulous, subtended by ovate bracteoles. Sepals 1.25 mm. long, ovate, very obtuse, bluntly convex beneath, ciliate. Petals 4—4.5 mm. long, obovate, rounded at the apex, widely cuneate at the base, slightly concave above, glabrous, with several large glands beneath. Stamens glabrous. Staminodes 2.5 mm. long, oblong, terminating in a conical gland, concave above, glabrous. Disk fleshy, crenulate. Ovary glabrous, with 5 carpels bearing erect-spreading elliptic or obovate fleshy processes furrowed on the inner face. Style glabrous, slightly recurved in the upper half.

CERES DIV.: between "Rosendalfontein" and Visgat, *Pillans* 9643; Olifants River Mts., ridge south of Groen, *Esterhuysen* 13430.—CLAN-WILLIAM DIV.: Cederberg, *Bath* in Bolus Herb. 15691 (type), *Pocock* 657; Krakadouwberg, *Esterhuysen* 7485, 15017, *Stokoe* in S. Afr. Mus. Herb. 59371; Northern Cederberg, peak near Koupoort, *Esterhuysen* 12178; mountain above Hot Baths, *Compton* 5377.

Flowering July—Nov.

2. *A. insignis* comb. nov. *Barosma insignis* *Compton in Journ. S. Afr. Bot.* xi, 106 (1945)!

A robust shrub usually 120—130 cm. high, entirely glabrous. Branchlets red-brown, ridged below the petioles. Leaves mostly 2.5—3.5 cm. long, alternate, erect-spreading, oblanceolate-elliptic or narrowly obovate, acute or subacute, very often apiculate, rounded at the base, slightly convex above, slightly thickened at the margin, obscurely crenulate or entire, with a conspicuous primary and several secondary nerves beneath, with marginal glands mostly 15—18 at each side, and with scattered glands evident above and beneath. Flowers 1—3 together at the ends of short axillary branchlets bearing much reduced leaves. Peduncles 5—8 mm. long, subtended by lanceolate bracteoles. Sepals 3 mm. long, widely ovate, acute, obtusely convex behind the apex. Petals 1—1.5 cm. long, ovate-lanceolate, tipped with a small gland, with a subquadrate basal claw, slightly concave above, with several conspicuous glands about the middle. Stamens with stout filaments. Staminodes 4 mm. long, linear-lanceolate, tipped with a large conical gland, fleshy, slightly concave above. Disk fleshy, crenulate. Ovary with 5 carpels bearing obovate fleshy processes with the margin increasingly incurved from the middle to the base, so as to resemble an inverted equine hoof. Style glabrous.

CERES DIV.: Elands Kloof, banks of stream, *Compton* 12494 (type, in Kirstenbosch Herb., cotype in Bolus Herb.), *Leighton* 1267; Wabooms

River, *Compton* 16750, *Lewis* in S. Afr. Mus. Herb. 56536; Upper Olifants River Valley, *Visgat*, bank of river, *Esterhuysen* 13401.

Flowering Sept.—Nov.

3. ***A. distans*** sp. nov.; ramulis glabris; foliis alternatis vel oppositis ellipticis-vel obovatis-oblongis mucronatis glabris, supra paulum concavis; floribus axillaribus; pedunculis glabris ebracteolatis; sepalis ovatis acutis glabris, margine membranaceis; petalis obovatis cuspidatis, basin versus attenuatis; staminibus valde recurvis; staminodis lanceolatis, apice glandula rotundata notatis; ovario 5-loculari glabro, cornubus obovatis; stylo glabro.

Shrubs about 70 cm. high, entirely glabrous. Leaves mostly 2—2.5 cm. long, alternate or opposite, erect-spreading, elliptic- or obovate-oblong, tapering shortly to a mucro, widely cuneate at the base, slightly concave above, usually very slightly crenulate at the margin, conspicuously nerved beneath, with small scattered and larger marginal glands mostly 5—11 on each side. Flowers solitary at the ends of very short axillary leafless branchlets. Peduncles 2.5 mm. long, subtended by lanceolate bracteoles. Sepals 2 mm. long, ovate, acute, membranous at the margin, obtusely convex beneath. Petals 6.5 mm. long, obovate, recurved and acutely cuspidate at the apex, attenuate towards the base, slightly concave above, distinctly nerved beneath. Stamens much recurved. Staminalodes 3.25 mm. long, lanceolate, concave above, terminating in a large rotund gland. Disk fleshy, crenulate. Ovary with 5 carpels bearing transversely obovate processes with closely involute margins and resembling an inverted equine hoof.

CLANWILLIAM DIV.: Pakhuis Mt., *Esterhuysen* 7420, 7699, 8013 (type, in Bolus Herb.), 14989.

Flowering Sept. The affinity is with *A. insignis* from which it is distinguished by the marginal glands on the leaves being fewer and by the processes on the ovary not being expanded. The name alludes to the wide spacing of the marginal glands on the leaves.

4. ***A. ovata*** comb. nov. *Diosma pulchella* *Houttuyn*, *Pflanz. Syst.* iii, 288, t. 21, f. 2 (1775) non *Linn.* ***D. ovata*** *Thunb. Prodr.* 43 (1794)!; *ej. Diss. Diosm.* 13 (1797); *Willd. Sp. Pl.* i, 1139 (1798); *Andrews, Bot. Rep.* t. 464 (1807); *Pers. Syn. Pl.* i, 247 (1808); *Ait. Hort. Kew*, ed. 2, ii, 33 (1811); *Sims in Curt. Bot. Mag.* t. 1616 (1814); *Roem. and Schultes, Syst. Veg.* v, 442 (1819); *Thunb. Fl. Cap. ed. Schultes* 227 (1823); *DC. Prodr.* i, 714 (1824); *Spreng. Syst. Veg.* i, 785 (1826). ***D. lanceolata*** *Thunb. Prodr.* 43; *ej. Diss. Diosm.* 13; *Willd. Sp. Pl.* i, 1137 excl. syn. omn.; *Ait. Hort. Kew*, ed. 2, ii, 31; *Thunb. Fl. Cap. ed. Schultes* 226. ***D. oblonga*** *Thunb.*

in Hoffm. *Phytogr. Blätter* i, 23 (1803); Roem. and Schultes, *Syst. Veg.* v, 460; Thunb. *Fl. Cap. ed. Schultes* 227 (1823); Spreng. *Syst. Veg.* i, 785. **Bucco ovata** Wendl. *Collect.* 62, t. 20 (1805); Roem. and Schultes, *Syst. Veg.* v, 442. **Diosma graveolens**, **D. punctata** Licht. ex Roem. and Schultes, *Syst. Veg.* v, 461 (1819). **D. linifolia** Lodd. *Bot. Cab.* iv, t. 400 (1819) non Licht. **D. dioica** Ker in Edwards' *Bot. Reg.* t. 502 (1820); Spreng. *Syst. Veg.* i, 785 (1825). **D. glandulosa**, **D. orbicularis** Hort. ex Bartl. and Wendl. *Diosm.* 110 (1824) non Thunb. **Barosma angustifolia** Bartl. and Wendl. *Diosm.* 116. **B. dioica** Bartl. and Wendl. *Diosm.* 114. **B. oblonga** Bartl. and Wendl. *Diosm.* 112; Sond. in Harv. and Sond. *Fl. Cap.* i, 396 (1860). **B. ovata** Bartl. and Wendl. *Diosm.* 109; Sond. *op. cit.* 395. **Bucco hamata** Wendl. ex Bartl. and Wendl. *Diosm.* 114. **Diosma stenophylla** Spreng. *Syst. Veg.* i, 785. **D. spartiifolia** Steud. in *Flora* xiii, 550 (1830). **Barosma graveolens** G. Don. *Gen. Syst.* i, 786 (1831). **B. scoparia** Eckl. and Zeyher, *Enum.* 103 (1835)!; Sond. *op. cit.* 396, excl. syn. *microphylla*. **B. ternata**, **B. pauciflora** Eckl. and Zeyher l. c. **B. Eckloniana** Bartl. in *Linnaea* xvii, 363 (1843)! **B. Kraussiana** Buch. ex Meissn. in *Flora* xxvii, 303 (1844); Meissn. in Krauss, *Beitr.* 40 (1846)! **B. setuliflora** Delporte in *Mem. Acc. Torino* ser. 2, xiv, 408, t. 9 (1854). **B. acutata** Sond. *op. cit.* 395. **B. lanceolata** Sond. *op. cit.* 397, incl. vars.; Engl. in Engl. and Prantl, *Pflanzenfam.* iii, §4, p. 148 (1896); De Wildeman, *l.c. Select. Hort. Then.* vi, t. 222 (1908). **B. Peglerae** Dümmer in *Kew Bull.* 1912, p. 326!

A much branched shrub usually 1—2 m. high, with puberulous branchlets, or sometimes glabrous on strips immediately below the leaves. Leaves mostly 0.5—1.5 cm. long, opposite, ternate, alternate or scattered, sometimes crowded, erect-spreading, orbicular, rotund, ovate, obovate, elliptic, elliptic-oblong, oblong, linear-oblong, lanceolate, oblanceolate or lanceolate-linear, \pm obtuse or truncate, often abruptly recurved at the apex, rounded or cuneate at the base, flat or \pm convex above, \pm revolute at the margin, or with the margin recurved to the nerve, with large or small scattered glands beneath, usually \pm gland-crenate, glabrous or \pm puberulous above and beneath. Flowers 1—4 together, axillary. Peduncles 0.5—8 cm. long, usually on a very short or sometimes conspicuous bracteate stipe, glabrous or puberulous, subtended by oblong or ovate bracteoles. Sepals 0.75—2 mm. long, widely or deltoid-ovate, ovate, ovate-lanceolate or lanceolate, obtuse, sometimes slightly keeled beneath, entirely puberulous or glabrous, or puberulous only above. Petals 3.5—4.5 mm. long, elliptic, ovate- or obovate-elliptic, very obtuse, widely cuneate at the base, slightly concave above, glabrous, or minutely ciliolate at the apex, sometimes sparsely pubescent above on the nerve, with many glands beneath. Stamens glabrous. Staminodes 1.5—2.5 mm. long, oblong, oblanceolate- or lanceolate-

oblong, lanceolate, lanceolate-linear or linear, tipped with a conical gland, slightly concave above, ciliate, often pubescent above and beneath, with a prominent nerve beneath. Disk crenulate. Ovary glabrous, studded with glands, with 5 carpels bearing oblong, obtuse, truncate or emarginate processes. Style glabrous, often recurved.

South Africa: without precise locality, *Cooper* 1757, *Drège* 7082, *Hesse*, *Mund*, *Niven* (type of *Barosma acutata* in Stockholm), *Sparrman*, *Thom*, *Thunberg*.—**Basutoland:** *Moyena*, *Ashton* in *Bolus* Herb. 17372, *Dieterlen* 1345.—**Cape Province:** ALBANY DIV.: near Grahamstown, *Bennie* 78, *Britten* 2768; *Cross* 11, *Daly and Cherry* 953, *Daly and Sole* 29, 284, *Dyer* 48, 181, *Galpin* 77, *Gane* 14, *Guthrie* 3306, *Long* 211, *Rogers* 27446, 28686, *Schönland* 111, *Story* 2575; Howieson's Poort, *Schönland* 755; near Collingham, *Britten* 5415; Bothasberg, *MacOwan* 1183; hill above drift in Botha's River, *Britten* 5524; Trumpeter's Drift, *Dyer* 521; Kurukuru River, *Burchell* 5313; between the end of Zwartwater Poort and the east end of Zwartwater Poort Berg, *Burchell* 3444.—ALBERT DIV.: Klaklazole Berg, *Cooper* 1757.—ALEXANDRIA DIV.: Alicedale, *Marloth* 4099, 4271, 10907.—BATHURST DIV.: Trappe's Valley, *Sidey* 1908; Hopewell, *Acocks* 11065, 11069, *Compton* 19830.—CALEDON DIV.: Swartberg, *Bolus* 9165, 9911, *Ecklon and Zeyher* 804, 805, *MacOwan* in Herb. Austr.-Afr. 1417, *Marloth* 4261, 7108, 9217, *Schlechter* 5547, *Wordsworth* in *Bolus* Herb. 14021; Ezeljagt, *Salter* 4656; near Greyton, *Esterhuysen* 5080; mountains at Genadendal, *Bolus* 7379, *Burchell* 7830; Happy Valley, *Bond* 987; near Villiersdorp, base of De Doorns, *Esterhuysen* 1907; Sir Lowry's Pass, *Schlechter* 7820.—EAST LONDON DIV.: about 14 miles north of East London, *Courtenay Latimer* in East London Mus. Herb.—GEORGE DIV.: The Wilderness, *Compton* 7572, 10757, 15760, *Levyns* 776, 5017, *Walgate* 267; west side of Kayman's River, *Burchell* 5793; Hooge Kraal Pass, *Fourcade* 5702; Touw River, *Fourcade* 6419; Victoria Bay, *Thorn* in S. Afr. Mus. Herb. 51689; Bergplaats, *Fourcade* 5256; Silver River, *Schlechter* 5878; Montagu Pass, *Schlechter* 5800, 5844, *Zinn* in S. Afr. Mus. Herb. 54811; Cradock Mt., *Burchell* 5925, *Galpin* 3865; Keurbooms River, *Compton* 7177, *Fourcade* 5240; near Bergplaats, in forest, *Parker* 4425.—HERSCHEL DIV.: Majuba Nek, Sterkspruit, *Hepburn* 10.—HUMANSDORP DIV.: Humansdorp, *Kennedy* 892, *Rogers* 2954, *Thode* A714; Loerie Plantation, *Dix* 80, 235; Clarkson, *Thode* A768; slopes above Witte Els Bosch, *Fourcade* 795, *Hutchinson* 1399; Riet Vlei, *Esterhuysen* 6654A; Witte Els Bosch Peak, *Esterhuysen* 6738, 6761, 6775, 6775A; Storms River Bridge, *Story* 2851; Kromme River, near Goed Gelooft Drift, *Fourcade* 2284; Ratelbosch, coast cliffs, *Fourcade* 250; Kruisfontein Mt., *Galpin* 3866; Blaauwkrans Kloof, *Marloth* 13049; between Jeffrey's Bay and Ferreira Town, *Gillett* 2327.—KENTANI DIV.:

Kentani, *Pegler* 33 (type of *Barosma Peglerae* in Kew Herb., cotype in Bolus Herb.), 1249.—KING WILLIAM'S TOWN DIV.: Mt. Coke, *Sim* 1406.—KNYSNA DIV.: near the Knysna River Ford, west side, *Burchell* 5531; Barrington, *Compton* 7551; Belvedere, *Duthie* 37; Deep Walls, *J. Phillips* 28, *Rodin* 1170; Matjes River Mouth, *Gillett* 2044; Hoogberg, *Keet* 1065; Knysna Heads, *Galpin* 9564; 2 miles east of Keurbooms River, *Hutchinson* 1372; 2 miles east of Hoogkraal River, *Salter* 6763; "Forest Hall," *Newdegate* in S. Afr. Mus. Herb. 14422; Plettenberg Bay, *Rogers* 27885.—KOMGHA DIV.: near Komgha, Gwaku River, *Flanagan* 272; Kei Mouth, *Flanagan* 199.—LADISMITH DIV.: toll near Ladismith, *Marloth* 2933; Touws Berg, *Levyms* 6151; Roodeberg, *Esterhuysen* 17185; Huis River Pass, *Marloth* 12148; Molenaars Berg, *Compton* 20136; Klein Swartberg, *Marloth* 4003; below Toeverkop, *Esterhuysen* 13961.—LAINGSBURG DIV.: north base of the Witteberg, Whitehill, *Compton* 2974, 6592.—MACLEAR DIV.: between Elliot and Maclear, *Bolus* 24448; Gatberg, *Brauer* 516.—MONTAGU DIV.: hills near The Baths, *Compton* 18433, *Lewis* in S. Afr. Mus. Herb. 59370, *Page* in Bolus Herb. 15631; Keur Kloof, *Bond* 319, *Esterhuysen* 1839, *Walgate* 953; Rabiesberg, *Compton* 5789; Keisiesberg, *Compton* 18499, *Esterhuysen* 23424, *Lewis* in S. Afr. Mus. Herb. 59369, *Walgate* in Bolus Herb. 23424; between Montagu and Triangle, *Michell* 30; Langeberg, *Levyms* 6509.—MOSSEL BAY DIV.: Langeberg, "Langfontein", *Muir* 2463; near Vryer's Berg, *Muir* 1379; Riet Vlei, *Muller* in S. Afr. Mus. Herb. 25869.—MOUNT FLETCHER DIV.: near Kenegha Drift Hotel, *Acoks* 12197.—OUDTSHOORN DIV.: Rust en Vrede, *Dyer* 86.—PORT ELIZABETH DIV.: near Port Elizabeth, *I. L. Drège* 252, *Kemsley* 144, *Long* 207, *Tyson* 2188; Parson's Vlei, *Holland* 3861, *Long* 209, 210, 213; Walmer, *Paterson* 2537, 3165; between Port Elizabeth and Witte Klip, *Rodin* 1035; upper part of Maitland or Leadmine River, *Burchell* 4614; valley near Burchell, *A. H. Bolus* in Guthrie Herb. 3761.—PRINCE ALBERT DIV.: Seven Weeks Poort, *Compton* 4041, 7417, *Marloth* 2980, *Phillips* 1415.—QUEENSTOWN DIV.: Gwatyu Farm, mountain side, *Galpin* 8299; Andriesberg, *Galpin* 2024.—RIVERSDALE DIV.: Langeberg, *Muir* 2909; summit of Aasvogelberg, *Muir* 924, 1110; Garcia's Pass, *Muir* 3643; *Phillips* 315, *Sidey* 1771.—ROBERTSON DIV.: hills near Robertson, *Lamb* 321; MacGregor, *Galpin* 10072.—STOCKENSTROOM DIV.: Chumiesberg, *Ecklon and Zeyher* 812 (cotype of *Barosma pauciflora* in Stockholm).—STUTTERHEIM DIV.: south slope of Mt. Kemp, *Dyer* in Albany Mus. Herb.; Dohne Mt., *Galpin* 2459.—SWELLENDAM DIV.: between Sparrbosch and Tradouw, *Drège* 7083.—TSOLO DIV.: Ntywenka Pass, *Acoks* 12173.—UITENHAGE DIV.: Van Staadens, *Ecklon and Zeyher* 809 (cotypes of *Barosma scoparia* in Kew Herb., S. Afr. Mus. Herb. and Stockholm), 810, 811 (cotypes of *B. ternata* in Kew Herb., S. Afr. Mus.

Herb. and Stockholm), *I. L. Drège* 700, *Paterson* 2333, *West* 456, *Zeyher* 340, 1007, 2157; *Witte Klip*, *Holland* 3865; *Bethelsdorp*, *Paterson* 116; *Longmore Forest Reserve*, *Long* 1040; *Adow*, *Ecklon and Zeyher* 816, *Zeyher* 212, 371; *Elands River Mts.*, *S. Afr. Forest Dept. Herb.* 2231.—**UNIONDALE DIV.:** *Long Kloof*, *Castlenau* 75; hills near *Haarlem*, *Burchell* 5028, *Esterhuysen* 6921, *Fourcade* 2104; *Schönland* 3110, *Thode* A2434; hills south of *Kamanassi*, *Fourcade* 4679; *Kamanassi Mts.*, *Esterhuysen* 16452; *Helpmekaar Peak*, *Compton* 4589, 10454, *Esterhuysen* 4572; *Formosa Peak*, *Thorne* in *S. Afr. Mus. Herb.* 59372; *Twee Rivieren*, *Esterhuysen* 7059; *Mannetjeberg*, *Esterhuysen* 6451; *Outeniqua Mts.*, near *Joubertina*, *Esterhuysen* 10645; headwaters of *Waagenboom River*, *Fourcade* 2660.—**WORCESTER DIV.:** near *Worcester*, *Cooper* 1668 partly, 1757; *Omklairberg*, *Andrae* 369; mountains east of *Hex River*, *W. Dod* 4046, *Esterhuysen* 10334, *Tyson* 628; *Bain's Kloof Mts.*, *Esterhuysen* 1975; *Brandvlei Mt.*, *Compton* 8832, *Esterhuysen* 1949; *Witte Poort*, *Esterhuysen* 1808; *Keeromsberg*, *Esterhuysen* 9196; *Audensberg*, *Marloth* 2441; *Molenaarsberg*, *Esterhuysen* 14068.—**XALANGA DIV.:** *Cala*, at the reservoir, *Royffe* 199, *O'Brien* 135.—**Natal:**—*Dumisa*, *Rudatis* 414; 9 miles north of *Port Edward*, *Acocks* 10913; *Port Shepstone*, *Letty* 213; *Oribi Flats*, *McLean* 564; *Murchison*, *Wood* 304; *Inanda*, *Wood* 136; *Westville*, *Wood* 8609; summit of *Table Mt.*, *Krauss* 466 (cotypes of *Barosma Kraussiana* in *Kew Herb. and Stockholm*); near *Durban*, *Springfield*, ? collector in *Natal Herb.* 17817; *Field's Hill*, *Evans* 604.—**Pondoland:**—*St. John's*, *Lindstrom* in *Bolus Herb.* 24456; *Ntsubane Forest Station*, *Galpin* 10971, *Louw* in *S. Afr. Forest Dept. Herb.* 7867, *Fraser* in *Bolus Herb.* 24457; *Lusikisiki*, *v. d. Merwe* 2527.

• Flowering Jan.—Dec. A very variable and widely distributed species with forms which have the appearance of distinct species, but it has not even been possible to separate them into varieties, since they are all connected by intermediates. The variation in the size and shape of the leaves, sepals and staminodes is no greater than in several other widely distributed species. The widest leaves with the largest glands prevail in the south-western districts. The leaves and glands diminish in size eastwards and northwards.

5. ***A. crenulata*** comb. nov. *Diosma crenulata* Linn. *Cent. Pl.* ii, 11 (1755); *ej. Amoen. Acad.* iv, 308 (1759). ***D. crenata*** Linn. *Syst. Nat.* ed. 10, p. 11 (1758); *Thunb. Prodr.* 43 (1794); *ej. Diss. Diosm.* 14 (1797); *Murr. Syst. Veg.* 250 (1797) excl. syn. Berg.; *Willd. sp. Pl.* i, 1138 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Thunb. Fl. Cap. ed. Schultes* 227 (1823); *Pappe, Med.* 5 (1850); ed. 2, p. 7 (1857). ***D. latifolia*** Andrews, *Rep. t.* 33 (1797) non L.f.; *Lodd. Bot. Cab.* iii, t. 290 (1818); *Spreng.*

Syst. Veg. i, 785 (1825). **D. serratifolia** Curt. *Bot. Mag.* t. 456 (1799); *Vent. Malm.* t. 77 (1803-05); *Ait. Hort. Kew.* ed. 2, ii, 32; *Lodd. Bot. Cab.* iv, t. 373 (1819); *Burchell, Travels* i, 479 (1822); *DC. Prodr.* i, 714 (1824); *Spreng. Syst. Veg.* i, 785 (1825). **Parapetalifera odorata** Wendl. *Collect.* i, 50, t. 15 (1805). **Barapelutiflora** (sic) **serrata** Wendl. *Collect.* i, 92, t. 34. **Barosma odorata** Willd. *Enum. Hort. Berol.* 257 (1809). **Baryosma odorata**, **B. serratifolia** Roem. and Schultes, *Syst. Veg.* v. 448 (1819). **Bucco crenata** Roem. and Schultes *op. cit.* 444. **Adenandra cordata**, **A. serratifolia** Link, *Enum. Hort. Berol.* i, 239 (1821). **Barosma serratifolia** Willd. *Enum. Hort. Berol.* 257 (1809); Bartl. and Wendl. *Diosm.* 98, t.B.f.6 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 393 (1860); *Schnizlein, Iconogr.* iv, t. 251 (1866-70); *Engler in Engl. and Prantl, Pflanzenfam.* iii, §4, p. 148 (1896); *Sim, Forest Fl. of Cape Colony* 155 (1907); *Marloth, Fl. S. Afr.* ii, §1, f. 68 (1925). **Diosma odorata** DC. *Prodr.* i, 714 (1824). **Barosma crenata** Sweet, *Hort. Brit.* ed. 1, p. 89 (1826). **Agathosma latifolia** Loud. *Hort. Brit.* 85 (1830). **Barosma crenulata** Hook. in Curt. *Bot. Mag.* t. 3413 (1835); *Sond. op. cit.* 393; *Schnizlein l. c.*; *Engler l. c.*; *Edmonds and Marloth, Elem. Bot. S. Afr.* 142 (1897); *Henslow, S. Afr. Fl. Pl.* 116 (1903); *Sim l. c.*; *Stoneman, Plants and their Ways in S. Afr.* ed. 2, pp. 138, 324 (1915); *Marloth, op. cit.* p. 104, t. 36E. **B. Eckloniana** O. Berg in *Bot. Zeitung* ix, 911, t. xii, ff. o—q (1853) non Bartl. and Wendl.

Shrub up to 2.5 m. high with glabrous or partly puberulous branchlets. Leaves mostly 1.5—3.5 cm. long, opposite, erect-spreading, lanceolate, ovate- or oblong-lanceolate, sometimes ovate or obovate, obtuse or truncate, cuneate at the base, flat or slightly convex above, serrate, with small scattered glands beneath and larger glands at the margin, conspicuously nerved beneath, glabrous. Flowers solitary at the ends of short, often leafless axillary branchlets. Peduncles 1.5 mm. long, glabrous or sparsely puberulous, subtended by lanceolate bracteoles. Sepals 3.5 mm. long, ovate-lanceolate, obtuse, ciliolate, obtusely keeled. Petals 7—9 mm. long, ovate, obtuse, cuneate and ciliate at the base, slightly concave above, usually with many glands beneath near the nerve. Stamens with filaments villous on the lower half. Staminodes 3—3.5 mm. long, lanceolate, obtuse, concave above, membranous, ciliolate, with a gland behind the apex. Disk fleshy, crenulate. Ovary with 5 carpels having a row of minute stalked glands on the margins, and bearing ovate-rotund dorsally compressed processes involute at the base and sparsely pubescent above. Style villous on the lower half, recurved in the upper half.

South Africa: without precise locality, *Drège* 7079, 7079a, 7079b.—**CALEDON DIV.:** between Moordenaars Kloof and Langkloof, *Stokoe* in

S. Afr. Mus. 59367; kloof west of Rooskraalberg, *Esterhuysen* 2660; Genadendal, *Roser* in National Herb. 15419; Hottentots Holland Mts., *Ecklon and Zeyher* 800; Dwarsberg, *Stokoe* 8505.—CERES DIV.: gorge west of Ceres, *Hutchinson* 572.—PAARL DIV.: valley north of Limietberg, *Esterhuysen* 1638; Wemmershoek Mts., *Wasserfall* 558.—RIVERSDALE DIV.: waterfall at Garcia's Pass, *Burchell* 7051, *Muir* 462, *Phillips* 363.—STELLENBOSCH DIV.: upper Lourens River Valley, *Parker* 3893; Jonker's Hoek, *Marloth* 9381; Sneeuwkop, *Marloth* 486b.—SWELLENDAM DIV.: Tradouw Pass, Klein Poort, *Marloth* 486, 8613; Voormansbosch, *Zeyher* 2173; above Duyvelsbosch and Grootvadersbosch, *Ecklon and Zeyher* 802; mountains near Swellendam, *Kennedy* in Bolus Herb. 1394, in MacOwan Herb. 2414; Lemoenshoek Peak, *Esterhuysen* 10490; Tradouwsberg, S. Afr. Forest Dept. Herb. 1723.—TULBAGH DIV.: mountains near Tulbagh, *Ecklon and Zeyher* 800; Winterhoek Mts., *Reynhardt* in Bolus Herb. 24458.—WORCESTER DIV.: Wabooms River, *Esterhuysen* 8957; Bain's Kloof, *Morton* in Acocks Herb. 1932.

Flowering June—Nov.

6. *A. betulina* comb. nov. *Hartogia betulina* Berg. Pl. Cap. 67, (1767). *Diosma betulina* Thunb. Prodr. 43 (1794); ej. Diss. Diosm. 13 (1797); Willd. Sp. Pl. i, 1140 (1798); Pers. Syn. Pl. i, 247 (1805); Thumb. Fl. Cap. ed. Schultes 227 (1823); DC. Prodr. i, 714 (1824); Spreng. Syst. Veg. i, 785 (1825). *Bucco betulina* Roem. and Schultes, Syst. Veg. v, 443 (1819). *Diosma crenata* Lodd. Bot. Cab. t. 404 (1820) non Linn. *Barosma betulina* Bartl. and Wendl. f. Diosm. 102 (1824); Sonder in Harv. and Sond. Fl. Cap. i, 393 (1860); Engl. in Engl. and Prantl, Pflanzenfam. iii, §4, p. 148 (1896); Sim, Forest Flora of Cape Colony 155 (1907); Marloth, Fl. S. Afr. ii, §1, f68 (1925).

Branchlets warted, glabrous. Leaves mostly 1—2 cm. long, opposite or alternate, erect-spreading, slightly recurved at the apex, obovate, sometimes very widely so, obtuse, cuneate towards the base, serrate, glabrous, concave up the middle, convex at the margin, with a conspicuous primary nerve and often with secondary nerves beneath, with marginal and scattered glands beneath. Flowers solitary at the ends of very short axillary branchlets bearing very much reduced leaves. Peduncles about 1 mm. long, glabrous, with lanceolate ciliolate bracteoles near the base. Sepals 2·5—3 mm. long, lanceolate or ovate-lanceolate, obtuse, ciliolate, puberulous above on the upper half, obtusely keeled beneath. Petals 0·8—1 cm. long, ovate-lanceolate or elliptic-oblong, very obtuse, cuneate in the lower half, glabrous or sparsely pubescent above, \pm ciliolate or ciliate, slightly swollen behind the apex, with many glands beneath near the nerve. Stamens with pubescent filaments. Staminodes 3·5

mm. long, oblong-lanceolate, obtuse, tapering towards the base, gland-tipped, concave above, ciliate, with the margin involute near the apex. Disk fleshy, crenulate. Ovary with 5 carpels having stalked glands at the sides and bearing obovate-rotund dorsally compressed processes sparsely pubescent above ciliate and with marginal swellings at the base. Style recurved, pilose on the lower half.

CERES DIV.: Elands Kloof Pass, *Barker* 3789, *Bond* 624; *Compton* 7077, 16206, *Esterhuysen* 3138, *Hafstrom and Acocks* 785.—CLANWILLIAM DIV.: Brakfontein, *Ecklon and Zeyher* 801, *Drège* 7079c, 7080; below Uitkyk Pass, *Acocks* 5689; above Uitkyk Pass, *Gillet* 4100; Vogel Vlei, *Schlechter* 7919; Cederberg, *Thode* A 1972, 2148; Algeria, *Galpin* 10535; Schimmelberg, *Pillans* 9088; Olifants River Mts., *Schlechter* 5115; Middelberg *Leipoldt* 886; Krakadouw Peak *Stokoe* in S. Afr. Mus. Herb. 59365; mountain above Warm Baths *Stephens* in Percy Sladen Mem. Exped. 7116.—PIKETBERG DIV.: plateau on Capitein's Kloof Mt. *Pillans* 7880; hills below Mouton's Vlei, *Pillans* 7348, *Marloth* 11472, 11473, 11474; Versveld's Pass, *Bond* 1029, *Esterhuysen* 5511; Vogel Vei, *Schlechter* 7919; top of Kapitein's Kloof, *Salter* 8160; Piketberg Mt., *Bolus* 13528, *Guthrie* 2566.—TULBAGH DIV.: mountains near Tulbagh, *Guthrie* 2720; Winterhoek, *Bolus* 5325.

Flowering June—Nov.

7. *A. namaquensis* nom. nov. *Barosma Niveni* Sond. in *Harv. and Sond. Fl. Cap.* i, 398 (1860)!

Branchlets puberulous. Leaves 0·6—1·2 cm. long, opposite, erect-spreading, elliptic- or ovate-oblong, or lanceolate-ovate, subacute or acute, rounded at the base, flat or very slightly concave above in the upper half, with scattered and marginal glands and a slightly impressed nerve beneath, thickened and scarcely crenulate at the margin, warted above, minutely puberulous above and beneath, becoming glabrous. Flowers 1 or 2 together in the axils of the upper leaves. Peduncles 4—6 mm. long, puberulous, subtended by linear-oblong bracteoles. Sepals 2·5 mm. long, lanceolate- or deltoid-ovate, gland-tipped, puberulous, with large glands beneath. Petals 4·5 mm. long, elliptic-oblong, obtuse, cuneate at the base, glabrous. Stamens with filaments sparsely pubescent on the lower half. Staminodes 2 mm. long, linear-oblong, obtuse, gland-tipped, incurved at the margin, sparsely pilose beneath. Disk crenulate. Ovary with 5 carpels bearing clavate rigidly pubescent processes, glabrous elsewhere. Style sparsely pubescent throughout.

South Africa: without precise locality, *Niven*.—NAMAQUALAND: Modderfonteinsberg, Roodeberg and Ezelskop, *Drège* 7128 (type, in Stockholm, cotype in Kew Herb.); summit of Sneeuwkop, *Pearson and Pillans*

in Sladen Mem. Exped. 5787; Khamiesberg near Leliefontein, *Levy's* 4002.

Flowering Oct.—Dec.

8. ***A. adenandriiflora*** Schltr. in *Engl. Bot. Jahrb.* xxvii, 160 (1899)!; *Dümmer* in *Fed. Rep.* xi, 334 (1912). ***A. formosissima*** *Dümmer* in *Ann. Bolus Herb.* iii, 58 (1912)!

A shrublet with rigidly wiry, puberulous and \pm pilose branchlets. Leaves 0·7—1·2 cm. long, alternate, ovate, obovate, elliptic, ovate-lanceolate or sometimes subrotund in outline, obtuse, rounded at the base, slightly convex above, slightly revolute at the margin, coriaceous, minutely scabrid above and beneath, minutely puberulous above, sparsely pilose on the margin, sometimes villous above and beneath in the juvenile state. Flowers in terminal clusters. Peduncles 0·8—1·3 cm. long, densely pilose, sometimes bearing stalked glands, subtended by widely obovate bracteoles. Sepals 4—8 mm. long, oblong, widely oblong, lanceolate-oblong or ovate-lanceolate, acute or subacute, densely silky villous, often bearing stalked glands. Petals 0·9—1·1 cm. long, widely oblanceolate, very obtuse, sometimes sparsely pubescent above, pubescent beneath. Stamens glabrous. Staminalodes 4·5—5 mm. long, linear, furrowed above, conspicuously nerved and pilose beneath, with a large crateriform gland at the apex. Ovary tubercled and setose or glabrous, bearing stalked glands on the apex, with 5 carpels furrowed and umbonate above. Style glabrous.

CERES DIV.: locality and collector unknown, *Bolus Herb.* 15849 (type of *A. formosissima*); Ertjiesland Kloof, *Compton* 16090; Koude Bokkeveld, *Schlechter* 8903 (cotypes of *A. adenandriiflora* in Albany Mus., *Bolus Herb.*, National Herb.); Baviaansberg, *Stokoe* 4547; Gydouw, *Compton* 18766, *Leighton* 2228; Zwart Ruggens, Stompiesfontein, *Levy's* 1863.—LAINGSBURG DIV.: Tweedside, on mountain, *Marloth* 10822, *Barker* in *Bolus Herb.* 20603, *Compton* 3999, 5909; Witteberg, *Compton* 3046, 3322, 5880, 7989, 12185, 13983, *Esterhuysen* 5147; Phisantekraal, *Compton* 21093.—WORCESTER DIV.: Hex River Mts., above Buffelshoek Twins, *Esterhuysen* 8394; Bonteberg, Eikenbosch Hoek, *Compton* 9944, *Esterhuysen* 3654 A; hills near Touws River, *Marloth* 2998.

Flowering Jan.—Nov.

9. ***A. craspedota*** *E. Mey. ex Sond.* in *Harv. and Sond. Fl. Cap.* i, 415 (1860)!; *Dümmer* in *Fed. Rep.* xi, 334 (1912). ***Hartogia craspedata*** *O. Kze. Rev. Gen.* i, 101 (1891). ***A. craspedota*** var. ***eglandulosa*** *Dümmer* in *Ann. Bolus Herb.* iii, 54 (1920)! ***A. denticulata*** *Dümmer l. c.*! ***A. utilis*** *Dümmer op. cit.* 55!

Branchlets puberulous. Leaves 0·6—1·5 cm. long, alternate, erect-spreading, obovate-oblong, obovate-elliptic or obovate, obtuse or subacute, cuneate or rounded at the base, slightly convex and glabrous or puberulous above, with a thickened and slightly revolute margin, usually crenulate at the margin, glabrous, or puberulous and with scattered glands beneath, with a slightly raised nerve. Flowers in terminal clusters or a few together in the axils of the upper leaves. Peduncles 6—9 mm. long, glabrous or puberulous, often with stalked glands, subtended by bracteoles. Calyx widely rounded or truncate at the base; tube widely cyathiform; sepals 2·5—4 mm. long, reflexed, deltoid-ovate, obtuse, slightly concave above near the apex, glabrous or \pm puberulous beneath, sometimes with stalked glands. Petals 4·5—6 mm. long, elliptic, obtuse, cuneate at the base, concave above near the apex, puberulous at the base. Stamens glabrous. Staminodes 2—2·5 mm. long, oblong-obovate, widening slightly and emarginate at the apex, with a large stalked gland in the sinus, almost flat and pubescent above, ciliate. Ovary with stalked glands on the apex, with 5 carpels bearing \pm clavate processes often retuse and setose at the apex. Style striate, glabrous.

South Africa: without precise locality, *Marloth* 7792 (type of *A. craspedota* var. *eglandulosa* in National Herb., cotype in Bolus Herb.).—CALVINIA DIV.: Van Rhyne's Pass, *Levy* 4087.—CLANWILLIAM DIV.: Blaauwberg, *Drege* (cotypes of *A. craspedota* in Bolus Herb., Kew Herb., S. Afr. Mus. and Stockholm); Giftberg, *Phillips* in Sladen Mem. Exped. 7524; Koudeberg, *Bolus* 8955 (type of *A. denticulata* in Kew Herb., cotype in Bolus Herb.); Pakhuis Pass, *Esterhuysen* 3141, 7410; Krakadouw Peak, *Esterhuysen* 7490, 8049; between Koupoort and Boontjieskloof, *Esterhuysen* 12195; Grootberg, *Esterhuysen* 4154; Waboom River Mts., *Compton* 6512; Cederberg, *Pattison* in Bolus Herb. 13734 (type of *A. utilis* in Bolus Herb.).—TULBAGH DIV.: Great Winterhoek, *Marloth* 2335.

Flowering Sept.—Dec.

10. A. Phillipsii *Dümmer* in *Ann. Bolus Herb.* iii, 57 (1920)!

A dwarf very much branched and rather compact shrublet with pubescent branchlets. Leaves 3—5 mm. long, alternate, erect-spreading, obovate or oblong-obovate, very obtuse, tapering shortly at the base, comparatively thick, concave above, rounded and with a few large glands beneath, patently pubescent, becoming glabrous. Flowers few, in terminal clusters. Peduncles 2—4 mm. long, pubescent, ebracteolate. Sepals 2—2·5 mm. long, oblong, obtuse, fleshy, concave above, rounded and with several conspicuous glands beneath, entirely pubescent. Petals 3·5 mm. long, oblong-obovate, obtuse, slightly concave above, entirely pubescent.

Stamens with filaments pubescent except at the base and near the apex. Staminodes 1 mm. long, oblong, acute, gland-tipped, pubescent on the middle. Disk pubescent within. Ovary pilose, with 5 carpels bearing rotund processes. Style villous almost to the apex.

CERES DIV.: Matroosberg, near Laken Vlei, in rock crevices, *Phillips* 1962 (type, in S. Afr. Mus. Herb.); Conical Peak, rock crevices, *Stokoe* 8309.

Flowering Dec., Jan. The most remarkable character is the presence of hairs on the inner face of the disk.

11. **A. Marlothii** *Dümmer* in *Ann. Bolus Herb.* iii, 51 (1920)! **Barosma Marlothii** *Schltr. ex Marl. Wiss. Ergebn. Deutsch. Tiefsee Exped.* ii, 111, 175 (1908) *absque descr.* **Agathosma perplexa** *Dümmer op. cit.* 52!

Branchlets puberulous. Leaves 0.5–1.4 cm. long, alternate, erect-spreading, elliptic, narrowly obovate, ovate or lanceolate, acute or obtuse, rounded or subcuneate at the base, slightly concave, flat or slightly convex above, scabridous and glabrous or puberulous above and beneath, thickened, gland-crenate and slightly recurved at the margin, with the nerve \pm prominent beneath, usually with 2 rows of slightly raised glands near the nerve. Flowers in axillary or terminal clusters. Peduncles 0.5–1 cm. long, glabrous or minutely puberulous, ebracteolate. Sepals 1.75–2.5 mm. long, elliptic or deltoid-oblong, deltoid-ovate or subrotund, very obtuse, concave above in the upper half, often membranous at the margin, glabrous or puberulous above and beneath, with large glands, reflexed during the flowering period. Petals 2.5–3.5 mm. long, elliptic, oblong-elliptic, oblanceolate-elliptic or subrotund, obtuse, cuneate or with a short linear claw at the base, glabrous, or rarely puberulous beneath on the upper half. Stamens glabrous, or sparsely pubescent at the base. Staminodes 0.75–1.5 mm. long, elliptic, elliptic-oblong or oblong-lanceolate, tipped with a gland, usually sparsely ciliate, sometimes sparsely pubescent above. Ovary gland-tubercled, with 5 carpels bearing oblong, often retuse and setose processes. Style glabrous, or sparsely setose on the lower half.

CERES DIV.: Michell's Peak, *Esterhuysen* 14765; Olifants River Mts., ridge south of Groen, *Esterhuysen* 13425; near Wagenboom River, Skurfsdeberg, *Schlechter* 10163 (type of *A. perplexa* in *Bolus Herb.*); Roodeberg, *Esterhuysen* 1475, *Stokoe* 8293.—CLANWILLIAM DIV.: near Citrusdal, Donker Kloof, *Stokoe* 9155; Elands Kloof, *Lewis* in *Bolus Herb.* 22050; Cederberg, *Stokoe* 8292; Grootberg, *Esterhuysen* 4154; Sandfontein Peak, *Esterhuysen* 13867; Sneeuwberg, near summit, *Esterhuysen* 13848; Tafelberg, kloof at the base, *Esterhuysen* 13805; Pakhuis, peaks at the head of the pass, *Esterhuysen* 14982.—TULBAGH DIV.: Great Winterhoek, *A.*

Bolus in Guthrie Herb. 4187 (type of *A. Marlothii* in Bolus Herb., cotype in Kew Herb.).—WORCESTER DIV.: Mostert's Hoek Twins, *Esterhuysen* 9865, *Wasserfall* 801; Waaihoek Mts., *Esterhuysen* 8291; Buffels Hoek Area, *Esterhuysen* 8430; Matroosberg, *Marloth* 2223, 2358, *Esterhuysen* 14192; Milner Peak, *Esterhuysen* 14230, 14907; Keeromsberg, *Esterhuysen* 9200.

Flowering Sept.—Jan. The most remarkable feature of this species is the wide variation in the shape of the leaves. The reflected sepals provide a character for distinction from allied species.

12. **A. Acocksii** sp. nov.; ramulis puberulis; foliis oblanceolato-oblongis vel elliptico-oblongis obtusis scabridis, supra convexis, margine revolutis glandulosis; floribus terminalibus; pedunculis pilosis ebracteolatis; sepalis ovatis vel ovato-lanceolatis obtusis, subtus pubescentibus; petalis late ovatis oblongo-ovatis vel elliptico-oblongis, basin cuneatis, infra medium ciliatis; staminibus infra medium sparse ciliatis; staminodis oblongo-fusiformibus, supra concavis, subtus pubescentibus, apice glandula notatis; ovario 5-loculari tuberculato ecornuto; stylo piloso.

A shrublet with slender puberulous branchlets having shortly stalked glands scattered on the younger parts. Leaves 4—8 mm. long, alternate, erect-spreading or spreading, oblanceolate-oblong or elliptic-oblong, obtuse, rounded at the base, convex and furrowed above, \pm revolute at the margin, with a much enlarged prominent nerve beneath, scabrid and minutely hispid above and beneath, often with small stalked glands beneath. Flowers in terminal clusters, usually 3 or 4 together. Peduncles 0.7—1 cm. long, pilose, sometimes with stalked glands, without bracteoles. Sepals 4—4.5 mm. long, ovate or ovate-lanceolate, obtuse, flattened, slightly concave towards the apex, glabrous above, pubescent and sometimes with stalked glands beneath. Petals 4.5—6 mm. long, widely ovate, oblong-ovate or elliptic-oblong, obtuse, cuneate and puberulous above at the base, often very sparsely puberulous beneath, ciliate on the lower half. Stamens with filaments sparsely ciliate on the lower half. Staminodes 2 mm. long, oblong-fusiform in outline, acute, widely based, concave above, pubescent beneath, with a long-stalked apical gland. Ovary tubercled, with 5 carpels without processes. Style pilose except towards the apex. Fruit with hispid gland-tipped tubercles.

CERES DIV.: Karoo Poort, *Acocks* 1665.—WORCESTER DIV.: Bonteberg, Eikenbosch Hoek, south slopes, *Esterhuysen* 3654 (type, in Bolus Herb.), *Compton* 9948; Touws River, sandstone hill, *Levy* 851.

Flowering Sept., Oct. The affinity is with *A. Phillipsii* *Dummer* but with the leaves convex above except for a furrow, and the ovary being glabrous.

13. **A. Pattisonae** *Dümmer in Ann. Bolus Herb.* iii, 54 (1920)!

Branchlets pubescent. Leaves 5—8 mm. long, alternate, erect-spreading, obovate-elliptic or obovate, acute or obtuse, cuneate at the base, slightly concave scabrid and somewhat puberulous above, with evident secondary nerves, gland-crenate, pubescent and with few glands beneath. Flowers in terminal clusters. Peduncles about 1 cm. long, sparsely pubescent, ebracteolate. Sepals 2 mm. long, deltoid-ovate, obtuse, rounded and pubescent beneath. Petals 8.5 mm. long, oblong-elliptic, obtuse, cuneate at the base, pilose beneath on the upper half, ciliate above the middle, with many conspicuous glands beneath. Stamens sparsely pubescent on the filaments. Staminodes 6 mm. long, oblong, with a large obovate apical gland, ciliate, distinctly nerved beneath. Ovary glabrous, with 5 carpels bearing short conical processes.

CLANWILLIAM DIV.: Cederberg, *Pattison* in *Bolus Herb.* 13733 (type, in *Bolus Herb.*, cotype in *Kew Herb.*).

Flowering Dec.

14. **A. Rehmanniana** *Dümmer in Fed. Rep.* xi, 336 (1912)!

Branchlets minutely puberulous. Leaves 0.6—1 cm. long, alternate, erect-spreading, ovate or elliptic, obtuse, rounded at the base, slightly concave or flat above, thickened at the margin, gland-crenate, with an impressed nerve and many scattered glands beneath, very minutely puberulous above and beneath. Flowers in terminal and lateral clusters. Peduncles 5—6 mm. long, minutely puberulous, ebracteolate. Sepals 3 mm. long, ovate-lanceolate, obtuse, with conspicuous glands and minutely puberulous beneath, reflexing after the flowering. Petals 4.5 mm. long, elliptic-oblong, obtuse, widely cuneate at the base, concave above at the apex, glabrous, with many large glands beneath. Stamens glabrous. Staminodes 1.5 mm. long, obtuse, apiculate, concave above, ciliate on the lower half. Ovary glabrous, with 5 carpels bearing linear-oblong, obtuse processes. Style glabrous. Fruit rugose, with linear processes 4 mm. long.

GEORGE DIV.: Montagu Pass, *Rehmann* 147 (type in *Brit. Mus.*, cotype in *Kew Herb.*).

In some respects this is closely related to *A. ovata*, of which it may be a form.

15. **A. pentachotoma** *E. Mey. ex Sond. in Harv. and Sond. Fl. Cap.* i, 405 (1860)! **Hartogia pentachotoma** *O. Kze. Rev. Gen.* i, 101 (1891). **Agathosma decora** *Dümmer in Ann. Bolus Herb.* iii, 49 (1920)! incl. vars. **Buchu** et **pseudohybrida**.

Branchlets puberulous. Leaves 2.5—8 mm. long, alternate, erect-

spreading, ovate, rotund-ovate, lanceolate-ovate or obovate, acute, subacute or obtuse, rounded at the base, slightly concave above, gland-toothed at the margin, widely convex and with occasional glands beneath, glabrous, \pm pubescent beneath, or ciliate at the base. Flowers in terminal clusters. Peduncles 0.75—2 mm. long, glabrous or hispidulous, subtended by narrowly linear or oblanceolate-linear ciliate bracteoles. Sepals 1—3.5 mm. long, oblong- or deltoid-ovate or rotund, obtuse or subacute, membranous at the margin, ciliate, sometimes with stalked glands at the margin, rounded or obtusely keeled beneath on the upper half, with a gland behind the apex. Petals 2.5—5.5 mm. long, glabrous; blade obovate or subrotund; claw 1—2 times as long, narrowly linear. Stamens glabrous. Staminodes 1.75—4.75 mm. long, narrowly linear, oblanceolate or oblanceolate-oblong in the upper half, obtuse or retuse, tapering downwards, glabrous, with a conspicuous apical gland. Disk crenulate. Ovary tubercled on the upper half, with 5 carpels bearing oblong, truncate, dorsally compressed processes furrowed above, sparsely setose about the apex, with 2 apical glands. Style \pm pubescent on the lower half. Fruit with closely set tubercles tipped with red glands.

CERES DIV.: Michell's Peak, swamp, *Esterhuysen* 14764; Matroosberg, near Laken Vlei, *Phillips* 1965 (type of *A. decora* in S. Afr. Mus. Herb.), 1966 (type of var. *Buchu* in S. Afr. Mus. Herb.), swampy ground, *Stokoe* 8302, *A. Bolus* in Guthrie Herb. 4395 (type of var. *pseudohybrida*).—PAARL DIV.: Haalhoek Sneeuwkop, swamp, *Esterhuysen* 9576; Upper Wellington Sneeuwkop, *Esterhuysen* 8650, 12812.—WORCESTER DIV.: Du Toit's Kloof, *Drège* (cotypes of *A. pentachotoma* in Kew Herb., S. Afr. Mus. Herb. and Stockholm); Witteberg Peak, *Esterhuysen* 23965; Waaihoek, *Esterhuysen* 8301, 9931, 15121; Hex River Mts., shale band below Milner Peak, *Esterhuysen* 7800, 9361, 14245; Shale Peaks, *Esterhuysen* 8737, 8740; foot of Sentinel, *Esterhuysen* 8750; Buffelshoek Peak, *Esterhuysen* 8544; Fonteinjesberg, *Esterhuysen* 10982.

Flowering Nov.—March.

16. *A. rubricaulis* Dümmer in *Fed. Rep.* xi, 404 (1912)!

A much branched shrub about 1 m. high, with pubescent, often reddish, branchlets. Leaves 3—4 mm. long, alternate, erect-spreading, ovate, subacute, rounded at the base, slightly incurved at the apex, slightly concave and sometimes puberulous above, gland-crenate, slightly convex, rugulose and pubescent beneath, with large glands confined to the margin. Flowers in terminal clusters. Peduncles 1.5—2 mm. long, glabrous, subtended by bracteoles. Sepals 2.25 mm. long, linear-lanceolate, subacute, concave above, slightly keeled beneath, ciliate near the base, or glabrous, with a conspicuous gland behind the apex. Petals 3.5

mm. long; blade obovate-elliptic, very obtuse; claw almost as long, slender, ciliate near the base. Stamens glabrous. Staminodes 2.5—2.75 mm. long, slender, widening upwards into an oblanceolate blade, ciliate on the lower half, with a large gland behind the apex. Disk readily splitting into 5 emarginate segments. Ovary with 5 or rarely 4 carpels bearing rounded hispid processes. Style pubescent except near the base and apex.

CLANWILLIAM DIV.: without precise locality, *Wallich* (type, in Kew Herb., cotype in Stockholm); Cederberg, Engelman's Kloof, *Esterhuysen* 8076; shale band south of Tafelberg, *Esterhuysen* 7880; Cederberg Peak, marsh, *Esterhuysen* 7588.

Flowering June—Sept. This species resembles and probably is nearly related to *A. pentachotoma*.

17. **A. Barnesiae** *Compton in Trans. Roy. Soc. S. Afr.* xix, 296 (1931)!

Branchlets minutely puberulous. Leaves 5—9 mm. long, alternate, erect-standing, often slightly incurved, oblong-elliptic, ovate or lanceolate-oblong, obtuse, apiculate, shortly cuneate, rounded or subcordate at the base, concave and minutely puberulous above, thickened and revolute at the margin, with glands only at the revolute margin, glabrous or minutely puberulous beneath. Flowers in terminal clusters. Peduncles 1—1.5 mm. long, stout, glabrous, ebracteolate. Sepals 2.5—3 mm. long, imbricate, apiculate, glabrous or \pm ciliate, glandular on the upper half; the outer widely obovate, rotund or orbicular, obtuse; the inner obovate-oblong or elliptic. Petals 4—5 mm. long, oblanceolate or oblong-oblanceolate, obtuse, sometimes bluntly apiculate, glabrous or ciliate. Stamens glabrous. Staminodes 3—3.5 mm. long, lanceolate, cuneate at the base, membranous, ciliate, bilobed at the apex, with the nerve projecting into the sinus and bearing an apical gland. Disk with a narrow free margin. Ovary coarsely tubercled, with 5 carpels bearing conical-oblong processes. Style glabrous. Fruit hispid on the apex.

LAINGSBURG DIV.: Witteberg, summit, *Compton* 3178 (type, in Bolus Herb.), 12222, 21119, *Taylor* 1241; south slope, *Compton* 5894.—PRINCE ALBERT DIV.: Seven Weeks Poort, north side, *Andreae* 1289, *Stokoe* 1843; Kreasberg, summit, *Stokoe* 8493.

Flowering Oct.—Dec.

18. **A. divaricata** sp. nov.; ramulis puberulis; foliis oppositis ovatis subacutis, supra paulum concavis minute tuberculatis, margine paulum revolutis; floribus terminalibus; pedunculis pubescentibus ebracteolatis; sepalis ovato-lanceolatis acutis pubescentibus; petalis oblongo-lanceolatis vel elliptico-oblongis glabris; staminibus glabris; staminodis linearibus glabris, apice glandula conica notatis; ovario 5-loculari glabro vel supra medium hispido, cornubus rotundatis; stylo glabro.

A low divaricately branched shrublet with puberulous branchlets. Leaves 3—6 mm. long, opposite, ovate, subacute, rounded at the base, slightly concave and with minute hair-tipped tubercles above, slightly revolute at the margin, with large glands beneath at the margin, with hair-tipped tubercles and large glands on a prominent nerve, elsewhere glabrous and almost smooth. Flowers solitary or in pairs at the ends of the branchlets. Peduncles 0.8—1 cm. long, pubescent, ebracteolate. Sepals 1.5—1.75 mm. long, ovate-lanceolate, acute, rounded-convex beneath, pubescent. Petals 5 mm. long, oblong-lanceolate or elliptic-oblong, cuneate at the base, glabrous. Stamens glabrous. Staminodes 2.5 mm. long, linear, concave above, with a conical gland at the apex, glabrous. Ovary glabrous, or hispid on the upper half, with 5 carpels bearing rotund processes. Style glabrous.

CERES DIV.: Southern Cederberg, spur of Hondverbrand Ridge, *Esterhuysen* 12726; Gideon's Kop, *Esterhuysen* 13891; Zwart Ruggens, "Stompiesfontein," *Levy's* 1882, 1882a.—CLANWILLIAM DIV.: Cederberg, Tafelberg, *Esterhuysen* 14393 (type, in Bolus Herb.).

Flowering Sept.—Nov. A possible affinity is with *A. spinescens* Dümmer.

19. *A. spinescens* Dümmer in *Fed. Rep.* xi, 336 (1912)! *A. Froemblingii* Dümmer *op. cit.* 335!

Branchlets puberulous, becoming rigid and spine-like when dry. Leaves usually 5—7 mm. long, sometimes 1 cm. long, opposite or alternate, erect-spreading, ovate, lanceolate or rarely rotund, acute, subacute or obtuse, rounded at the base, slightly concave above, thickened at the margin, gland-crenate, with a few glands beside a raised nerve, glabrous or puberulous. Flowers in terminal clusters or often 2 together on very short branchlets. Peduncles about 5 mm. long, pubescent, ebracteolate. Sepals 3—4 mm. long, widely ovate or elliptic, obtuse or subacute, ciliate, puberulous above and beneath or glabrous. Petals about 6 mm. long, oblong- or elliptic-ovate, very obtuse, cuneate at the base, glabrous, or puberulous above at the base. Stamens glabrous. Staminodes 2—2.5 mm. long, oblong-elliptic, tapering to a large terminal gland, dorsally compressed, pubescent above about the middle. Ovary papillate, glabrous, with 5 carpels bearing oblong processes somewhat bi- or trilobed, deeply furrowed above. Style glabrous. Fruit tubercled.

CALVINIA DIV.: Nieuwoudtville, *Leipoldt* in Bolus Herb. 23957; Willem's River, *Leipoldt* 865; Oorlogs Kloof, *Lewis* in Bolus Herb. 19804.—CERES DIV.: Zwart Ruggens, *Levy's* 1781.—CLANWILLIAM DIV.: near Pakhuis, *Leipoldt* in Bolus Herb. 20761; Bidouwberg, *Schlechter* 8683 (type of *A. spinescens* in Kew Herb., cotypes in Albany Mus., Bolus

Herb., Natal Herb., S. Afr. National Herb. and Stockholm); between Pakhuis and Wupperthal, Bidouw River, Diamond Drift, *Leipoldt* 3721; Cederberg, Matjesrivier, *Wagner* 178.

Flowering Aug., Sept. The type of *A. Froemblingii* is in Kew Herbarium. It was received from Dr. H. Bolus in June, 1898, without a record of the locality or collector. No portion was retained in the Bolus Herbarium. The leaves are unusually small.

20. *A. foetidissima* *Hortul. ex Steud. Nom. ed. 2, i, 35 (1840)*. *Barosma foetidissima* *Bartl. and Wendl. Diosm. 118 (1824)*; *Sond. in Harv. and Sond. Fl. Cap. i, 398 (1860)*; *Bailey, Standard Cycl. Hort. i, 454 (1914)*. *Diosma foetidissima* *Spreng. Syst. Veg. i, 785 (1825)*. *Agathosma Burchellii* *Dümmer in Kew Bull. 1912, p. 328!*

Branchlets minutely puberulous or almost glabrous. Leaves 0.5—1.2 cm. long, opposite, alternate or ternate, erect-spreading or spreading, linear or narrowly lanceolate-oblong, obtuse, rounded at the base, convex and puberulous above, furrowed up the middle, with a closely revolute margin bearing many large glands. Flowers in terminal clusters and several together in the axils of the upper leaves. Peduncles 4—6 mm. long, glabrous or puberulous, sometimes with small stalked glands, subtended by oblong-lanceolate bracteoles. Calyx glabrous or puberulous; sepals 1.5—2.5 mm. long, reflexed, widely ovate, ovate-obovate or elliptic-oblong, obtuse, submembranous in the lower half, with a large gland behind the apex. Petals 2.25—3.5 mm. long, widely oblanceolate, elliptic- or obovate-oblong, obtuse, ciliate at the base, with a gland behind the concave apex. Stamens with filaments sparsely pubescent at the middle. Staminodes 1—2 mm. long, lanceolate or oblanceolate-oblong, acute, slightly concave and pubescent above or ciliate, with a minute apical gland. Disk crenulate. Ovary glabrous, glandular on the apex, with 5 carpels bearing small rotund processes. Style glabrous or puberulous except near the apex. Fruit with large tubercles.

LADISMITH DIV.: Ladismith, *Marloth* 3977.—RIVERSDALE DIV.: dry hills near Speigel River, *Burchell* 7205 (type of *A. Burchellii* in Kew Herb.); hills near Riversdale, *Bolus* 11238, *Muir* 2955; Sandfontein, *Muir* 4506; Corenti River Farm, *Muir* 5065; "Oakdale," *Levy* 2854, 3552.—ROBERTSON DIV.: dry hills near Robertson, *Lamb* 253.—SWELLENDAM DIV.: Leuw River Mts., foothills near Swellendam, *Stokoe* 8291.

Flowering April—Oct. This species has a combination of some of the characters which have been used in distinguishing between *Agathosma* and *Barosma*.

21. *A. microcarpa* comb. nov. *Barosma microcarpa* *Sond. in Harv. and Sond. Fl. Cap. i, 398 (1860)!*

Branchlets puberulous. Leaves 0·8—1·5 cm. long, alternate, opposite or ternate, erect-spreading, lanceolate- or linear-oblong (elliptic-oblong when expanded), obtuse, rounded at the base, convex above, with a revolute margin often covering the lower face, minutely puberulous, with glands on the margin and scattered beneath. Flowers 1—4 together, axillary, distinctly below the ends of the branchlets. Peduncles 4—5 mm. long, puberulous, subtended by oblong obtuse bracteoles. Sepals 1·25—1·5 mm. long, lanceolate or ovate-lanceolate, obtuse, recurved, puberulous, ciliate, with many glands. Petals 3—4 mm. long, oblong-ovate or elliptic, obtuse, cuneate at the base, slightly concave above, sparsely puberulous beneath. Stamens glabrous. Staminodes 1·25—1·75 mm. long, lanceolate or oblanceolate, tipped with a minute gland, ciliate, sparsely pubescent beneath. Disk crenulate. Ovary studded with glands, puberulous on the apex, with 5 carpels without processes. Style sparsely puberulous on the lower half. Fruit with stalked glands on the apices of the carpels.

LADISMITH DIV.: Ladismith, *Marloth* 3977.—MOSSEL BAY DIV.: Little Brak River, *Lewis* in *Bolus* Herb. 24466.—RIVERSDALE DIV.: Gouritz River, *Drège* 7084 (type, in Stockholm), 7084a; Sandfontein, *Muir* 4506; *Albertinia*, *Muir* 1950.

Flowering June—Jan.

22. **A. cordifolia** sp. nov.: ramulis pubescentibus; foliis alternatis patentibus vel reflexis cordatis vel reniformibus subacutis, supra paulum convexis glabris; floribus terminalibus; pedunculis minute puberulis ebracteolatis; sepalis subrotundis ciliolatis; petalis anguste obovatis vel ellipticis glabris, infra medium unguiculatis; staminibus glabris; staminodis linearibus, infra medium filiformibus; ovario 5-loculari, cornubus obovatis vel oblongis sparse hispidulis; stylo pubescente.

Usually 40—50 cm. high, much branched, with slender pubescent branchlets. Leaves 1·5—2·5 mm. long and wide, alternate, spreading or slightly reflexed, cordate or reniform, subacute, slightly convex above, thickened and with large glands at the margin, slightly concave and without an evident nerve or glands beneath, glabrous, or at first hispidulous beneath. Flowers in terminal clusters. Peduncles 1 mm. long, minutely puberulous, ebracteolate. Sepals 0·75 mm. long, subrotund, very obtuse, expanded, concave above at the apex, ciliate, with a conspicuous gland behind the apex. Petals 2·5—3 mm. long, glabrous; blade narrowly obovate or elliptic, obtuse; claw almost as long, linear. Stamens glabrous. Staminodes 2 mm. long, linear in the upper half, obtuse, filiform in the lower half, glabrous, with a conspicuous gland behind the apex. Disk crenulate. Ovary with 5 carpels bearing obovate or oblong obtuse sparsely hispidulous processes. Style \pm pubescent.

Flowering Oct. The locality and collector of this very distinct species are unknown. It is founded on specimens numbered 16292 (type in Bolus Herb.). These were exhibited, in a living state, in a flower show in Cape Town during October, 1919. The species was later exhibited (*Acocks* 3259, *Compton* 6326) in Ceres, again without information about the collector or locality.

23. **A. decurrens** sp. nov.; ramulis puberulis; foliis alternatis vel oppositis oblongo-lanceolatis obtusis glabris, ad medium concavis, margine revolutis, floribus terminalibus; pedunculis glabris ebracteolatis; sepalis lanceolatis glabris; petalis ellipticis vel obovato-ellipticis, basin versus cuneatis; staminibus glabris; staminodis oblanceolatis glabris, apice glandula notatis; ovario 5-loculari glabro cornubus rotundis vel subquadratis; stylo glabro.

Shrublet about 25 cm. high, with puberulous branchlets. Leaves mostly 0·8—1 cm. long, alternate or rarely opposite, erect-spreading, oblong-lanceolate, obtuse, widely cuneate or rounded at the base, concave above up the middle, revolute and with large glands at the margin, glabrous, eglandular and with a prominent nerve beneath. Flowers terminal, 1 or 2 together. Peduncles 2 mm. long, glabrous, subtended by linear bracteoles 2·5—3 mm. long. Sepals 4·5—5 mm. long, lanceolate, obtuse, thickened at the apex, hyaline at the lower half of the margin, obtusely convex, with glands widely spaced in 2 rows. Petals 5—6 mm. long, elliptic or obovate-elliptic, very obtuse, tapering in the lower half to a wide base, slightly concave above. Stamens glabrous. Staminodes 2·5 mm. long, oblanceolate, widely based, slightly concave above, glabrous, with a conical gland at the apex. Disk crenulate. Ovary glabrous with 5 carpels bearing rotund or transversely oblong fleshy processes shortly decurrent on the backs of the carpels. Style glabrous.

WORCESTER DIV.: Slanghoek Mts., Cossacks, *Esterhuysen* 8619 (type, in Bolus Herb.).

Flowering Oct. The affinity is uncertain. The name alludes to the decurrent processes on the ovary.

24. **A. subteretifolia** sp. nov.; ramulis minute puberulis; foliis ternatis alternatis vel oppositis linearibus acutis subteretibus, margine arte revolutis, primum puberulis; floribus axillaribus; pedunculis puberulis ebracteolatis; sepalis ovato-lanceolatis subacutis ciliatis, subtus puberulis; petalis oblanceolato-oblongis sparse ciliatis, infra medium paulum attenuatis ciliolatis; staminibus infra medium pubescentibus; staminodis oblongis obtusissimis emarginatis ciliatis, supra sparse pubescentibus, sino glan-

dula ornatis; ovario 5-loculari, supra medium pubescente, cornubus pubescentibus, apice orbicularibus, basin versus involutis; stylo infra medium sparse pubescente.

A much branched shrub about 40 cm. high with slender minutely puberulous branchlets. Leaves mostly 1—1.2 cm. long, ternate, alternate or opposite, erect-spreading, linear, acute, rounded at the base, subterete, with a tightly revolute margin completely covering the lower face, at first puberulous, with a row of conspicuous glands near the margin. Flowers axillary, solitary. Peduncles 2 mm. long, puberulous, sub-tended by ovate-lanceolate bracteoles. Sepals 5 mm. long, ovate-lanceolate, subacute, ciliate, densely puberulous and with a raised nerve beneath. Petals 8—9 mm. long, oblanceolate-oblong, obtuse, tapering slightly to a rounded base, concave above, ciliolate on the lower half, sparsely pilose-ciliate on the upper half, with a gland behind the apex and a raised nerve beneath. Stamens with wide-based filaments dorsally compressed and pubescent in the lower half. Staminodes 2.5 mm. long, oblong, very obtuse, emarginate, with a gland in the sinus, concave above, slightly recurved at the apex, very sparsely pubescent above, pilose ciliate. Disk inconspicuous, scarcely crenulate. Ovary pubescent on the upper half, with 5 carpels bearing pubescent processes orbicular and expanded in the upper half, with a closely involute margin forming a funnel in the lower half. Style sparsely pubescent on the lower half.

MONTAGU DIV.: Keisiesberg, *Walgate* in Bolus Herb. 23425.

Flowering Sept. A very distinct species with an appearance unlike that of any other, and without any apparent affinity.

25. **A. stipitata** sp. nov.; ramulis puberulis; foliis alternatis oppositis vel ternatis cordatis vel late ovatis convexis minute puberulis vel glabris, margine revolutis crenulatis; floribus axillaribus; pedunculis glabris ebracteolatis; sepalis late ovatis obtusis minute ciliolatis; petalis ovatis obtusis ciliatis basi cuneatis; staminibus infra medium pubescentibus; staminodis lineari-oblongis sparse pubescentibus, apice glandula ornatis; ovario conspicue glanduloso glabro 5 loculari, cornubus transverso-oblongis, apice dentatis glandula ornatis; stylo glabro.

A much branched shrub usually 60—70 cm. high, with slender puberulous branchlets. Leaves 2—4.5 mm. long, alternate, sometimes opposite or ternate, erect-spreading, spreading or reflexed, cordate or widely ovate and widely rounded or subcordate at the base, obtuse, convex and minutely puberulous above and beneath or glabrous, revolute at the margin, crenulate, with conspicuous marginal glands, indistinctly veined beneath. Flowers solitary, axillary. Peduncles 3—4 mm. long, glabrous, sub-tended by elliptic ciliolate bracteoles. Sepals 1.5 mm. long, widely ovate,

obtuse, almost flat, minutely ciliolate, with conspicuous glands beneath. Petals 4.5 mm. long, ovate, obtuse, cuneate and ciliolate at the base, slightly concave above. Stamens with filaments much recurved, pubescent above in the lower half. Staminodes 3—3.5 mm. long, linear-oblong, tipped with a large gland, concave and sparsely pubescent above. Disk crenulate. Ovary glabrous, conspicuously studded with raised glands, with 5 carpels bearing transversely oblong processes with a depression at the apex, with uneven marginal teeth and a gland in the centre. Style glabrous. Fruit very distinctly stipitate, entirely covered with prominent glands.

CALEDON DIV.: Wildepaardeberg, *Stokoe* 2736 (type, in Bolus Herb.).—

ROBERTSON DIV.: near MacGregor, Boesmans Kloof Pass, *Esterhuysen* 4472.—WORCESTER DIV.: south-east side of Brandvlei Mt., *Esterhuysen* 1941.

Flowering Oct., Nov. While having some affinity with *A. pulchella* this species is very distinct, and is remarkable for the transversely oblong processes on the ovary.

26. ***A. zwartbergense*** sp. nov.; ramulis pubescentibus; foliis ovatis vel rotundato-ovatis obtusis, supra concavis glabris, margine crassis, subtus ecarinatis sparse pubescentibus; floribus terminalibus; pedunculis pubescentibus ebracteolatis; sepalis oblongo-lanceolatis obtusis, subtus paulum carinatis pubescentibus; petalis obovatis vel elliptico-obovatis, basi cuneatis sparse pubescentibus; staminibus filamentis puberulis; staminodis lineari-lanceolatis, apice glandula rotundata notatis; ovario 5-loculari, cornubus oblongis sparse setosis; stylo pubescente.

A moderately branched shrub usually about 20 cm. high, with puberulous or pubescent branchlets. Leaves 2.5—3.5 mm. long, alternate, erect-spreading, ovate or rotund-ovate, obtuse, rounded or somewhat cordate at the base, concave and glabrous above, thickened at the margin, ecarinate, sparsely pubescent and with conspicuous glands beneath. Flowers 2—4 together in terminal clusters. Peduncles 1.5 mm. long, stout, pubescent, without bracteoles, subtended by a lanceolate obtuse bract. Sepals 2 mm. long, oblong-lanceolate, obtuse, slightly gibbous behind the apex, pubescent and somewhat keeled beneath, with a few glands beside the keel. Petals 4.5—5 mm. long, obovate or elliptic-obovate, rounded at the apex, cuneate and sparsely pubescent at the base, puberulous behind the apex. Stamens with puberulous filaments. Staminodes 3.5 mm. long, linear-lanceolate, concave above, tipped with a round gland. Ovary with 5 carpels bearing oblong sparsely setose processes. Style pubescent except near the apex.

OUTDSHOORN DIV.: 5 miles west of Meiring's Poort, summit of Spitzkop; *Thome* in S. Afr. Mus. Herb. 50206.

Flowering Febr. This species has a distinct appearance and seems to be without any apparent affinity.

27. **A. tabularis** *Sond. in Harv. and Sond. Fl. Cap. i, 403 (1860). Hartogia tabularis O. Kze. Rev. Gen. 102 (1891). Barosma pulchella var. tabularis Dümmer in Fed. Rep. xi, 322 (1912); Esterhuysen in Fl. Cape Peninsula 539 (1950).*

Branchlets densely puberulous. Leaves 4·5—6 mm. long, alternate, erect-spreading, spreading or sometimes reflexed, ovate-lanceolate or ovate, obtuse, rounded or subcordate at the base, slightly convex above, bluntly serrate, glabrous, with an evident primary nerve and sometimes secondary nerves beneath, with 12—14 large glands confined to the margin. Flowers 1—3 together in the axils of the upper leaves. Peduncles 5—6 mm. long, glabrous, subtended by 2 oblanceolate ciliolate bracteoles. Calyx truncate at the base, glabrous. Sepals 1·5 mm. long, lanceolate-oblong, obtuse, convex beneath, with 2 rows of large glands. Petals 4·5 mm. long, glabrous; blade elliptic- or obovate-oblong, very obtuse, cuneate at the base, slightly concave above; claw half as long, linear. Stamens glabrous. Stamines 1·5 mm. long, narrowly linear, subacute, sparsely ciliate, eglandular. Disk conspicuously crenate, fleshy. Ovary glabrous, distinctly raised on a stout eglandular stipe, with 4 carpels closely studded with glands on the outer face, and bearing oblong, obtuse smooth processes. Style glabrous, recurved.

CALEDON DIV.: Caledon, in a ravine, *Wordsworth* in Bolus Herb. 14022; Zwartberg, *Marloth* 7109, *Schlechter* 5529; south-east of Kogelberg, *Stokoe* 8170, 8299; near Palmiet River Mouth, *Levy* in Bolus Herb. 24425, *Gillett* 4222; mountain at Genadendal, *Pappe* (?) in S. Afr. Mus. Herb. 14401, *Stokoe* 2485; Zonder Einde Mts., *Barnard* 427, *Stokoe* in S. Afr. Mus. Herb. 58843, 58844.—CAPE DIV.: Kirstenbosch, below Contour Path, *Compton* 9237, 15163, *Esterhuysen* 363, 11799, 12295; east slopes of Table Mt., *Hafstrom and Acocks* 2174.—PAARL DIV.: Wemmershoek Peak, *Stokoe* in S. Afr. Mus. Herb. 58841.—WORCESTER DIV.: Wilde Paardeberg, near top, *Stokoe* 1068.

Flowering Sept.—Dec.

28. **A. purpurea** sp. nov.; ramulis puberulis; foliis alternatis vel oppositis lanceolatis ovato- vel oblongo-lanceolatis obtusis, supra concavis glabris, subtus pubescentibus vel glabris conspicue punctatis; floribus terminalibus; pedunculis puberulis vel glabris ebracteolatis; sepalis lanceolato-oblongis obtusis valde reflexis, subtus convexis plus

minus puberulis; petalis ellipticis vel obovato-ellipticis, basi rotundatis vel subcuneatis; staminibus glabris; staminodis oblongo-lanceolatis ciliatis vel glabris, apice glandula ornatis; ovario 4-loculari tuberculato glabro vel sparse hispidulo, cornubus oblongis retusis; stylo glabro.

A much branched shrub about 60 cm. high, with puberulous branchlets. Leaves 4—5 mm. long, alternate or opposite, erect-spreading, lanceolate, ovate- or oblong-lanceolate, obtuse, rounded at the base, concave and almost smooth and glabrous above, rugose, sparsely pubescent or glabrous and with conspicuous glands scattered beneath. Flowers terminal, few together. Peduncles about 4 mm. long, puberulous or glabrous, subtended by linear bracteoles. Sepals 2 mm. long, lanceolate-oblong, obtuse, glabrous above, convex and \pm puberulous beneath, considerably reflexed. Petals 3—3.25 mm. long, elliptic or obovate-elliptic, very obtuse, rounded or subcuneate at the base, glabrous, purple. Stamens glabrous. Staminodes 1.25 mm. long, oblong-ob lanceolate, dorsally compressed, ciliate or glabrous, with a wide terminal gland. Disk crenulate. Ovary tubercled, glabrous or sparsely hispidulous, with 4 carpels bearing widely oblong, truncate, retuse processes. Style glabrous.

LADISMITH DIV.: Seven Weeks Poort, north side, south aspect, *Andrae* 1185 (type, in Bolus Herb.), *Primos* 80, *Stokoe* 1871; Toeverkop, lower south slopes, *Esterhuysen* 13966.—PRINCE ALBERT DIV.: Zwartberg, *Pocock* S52; Zwartberg Pass, *Stokoe* 8491, 9289; Krevasberg, *Stokoe* 8490.

Flowering Dec. This species is one of a group in which the leaves are sometimes opposite, the flowers usually few in a cluster, and the sepals conspicuously reflexed.

29. *A. hirsuta* sp. nov.; ramulis hirsutis; follis alternatis saepe confertis ovato-lanceolatis vel ovatis subacutis, supra paulum concavis sparse pilosis, subtus pilosis; floribus axillaribus; pedunculis glabris vel sparse pilosis ebracteolatis; sepalis ovatis obtusis ciliolatis; petalis ovatis obtusissimis glabris vel basin versus ciliolatis et cuneatis; staminibus glabris; staminodis oblongo-linearibus acutis vel subtruncatis, supra medium denticulatis ciliatis; ovario 4-loculari, infra medium pubescente, cornubus oblongis pilosis; stylo glabro.

Usually 30—40 cm. high. Branchlets hirsute. Leaves 0.5—1 cm. long, alternate, often crowded, erect-spreading, ovate-lanceolate or ovate, subacute, rounded at the base, slightly concave and usually sparsely pilose above, slightly revolute and crenulate at the margin, \pm pilose beneath, with a prominent nerve and conspicuous marginal glands. Flowers solitary in the axils of the upper leaves. Peduncles 3—4 mm. long, glabrous, or sparsely pilose on the upper half, subtended by rotund ciliolate bracteoles. Sepals 1.75 mm. long, ovate, obtuse or subacute, cilio-

late, obtusely convex and with conspicuous glands beneath. Petals 4.5—5 mm. long, ovate or widely ovate, rounded at the apex, cuneate at the base, slightly concave above, glabrous, or ciliolate near the base, with 1—3 conspicuous glands beneath. Stamens glabrous. Stamínodes 2.5 mm. long, oblong-linear or sometimes linear, acute or sometimes almost truncate, widened or, less often, attenuate in the upper half, usually toothed and sparsely ciliate on the upper half, with a small apical gland and often with minute marginal glands near the apex. Disk crenulate. Ovary pubescent on the lower half, with 4 carpels bearing erect oblong pilose processes. Style glabrous, very recurved.

CALEDON DIV.: Somerset Sneeuwkop and vicinity, *Stokoe* 4029, 5019, 8549 (type, in Bolus Herb.), in S. Afr. Mus. Herb. 58815; between Somerset Sneeuwkop and Triplets, *Esterhuysen* 8266; Triplets, *Esterhuysen* 12503.

Flowering Nov.—Jan. The staminodes often have different shapes in different plants. They either widen or narrow upwards. This variation is not accompanied by variation of other parts to a similar degree.

30. *A. Bodkinii* Dümmer in *Ann. Bolus Herb.* iii, 59 (1920)!

Branchlets puberulous. Leaves 3—4 mm. long, alternate, erect-spreading, narrowly ovate, obtuse, rounded at the base, widely concave and puberulous or glabrous above, rounded-convex, puberulous and with large glands confined to the margin beneath. Flowers in terminal clusters. Peduncles 1—2 mm. long, puberulous, subtended by or with small linear bracteoles at the base. Sepals 1.25—1.5 mm. long, ovate or elliptic, obtuse, concave above, ciliolate, rounded and puberulous beneath, with a gland behind the apex. Petals 2.5—2.75 mm. long, glabrous; blade obovate, obtuse; claw $\frac{2}{3}$ as long, narrowly linear. Stamens glabrous. Stamínodes 1.5—2.5 mm. long, narrowly oblanceolate-linear, glabrous, with an apical gland. Ovary with 4 or rarely 3 carpels bearing rounded puberulous processes. Style villous or pubescent on the lower half.

CLANWILLIAM DIV.: Cederberg, near Wupperthal, Sneeuwkop, *Bodkin* in Bolus Herb. 8958 (type, in Bolus Herb.); Cederberg, *Levy's* 2966, *Thode* A 1975; Cederberg Peak, marsh, *Esterhuysen* 7540; between Bushmans Cave and Crystal Pool, marsh, *Barnes* in Bolus Herb. 19308.

Flowering Sept.—Jan. The type consists of a single specimen, a dwarf young plant. The flowers have an ovary of 3 carpels. Later collections have shown that the usual number of carpels is 4.

31 *A. puberula* Fourcade in *Trans. Roy. Soc. S. Afr.* xxi, 99 (1932). *Diosma dubia*, *D. puberula* Steud. in *Flora* xiii, 548 (1830). *Agathosma*

gnidioides *Schldl. in Linnaea* vi, 206 (1831)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 416 (1860) incl. var.; *Dümmer in Fed. Rep.* xi, 402 (1912) incl. var. **Barosma gnidioides** *Eckl. and Zeyher, Enum.* 104 (1835). **B. mucronata**, *Meissn. in Flora* xxvii, 1, 303 (1844)!; in *Krauss, Beitr.* 40 (1846). **B. puberula** *Buchinger ex Meissn. l. c. in syn.* **Agathosma barosmoides** *Sond. l. c.; Dümmer l. c.* **Hartogia barosmoides**, *H. puberula* *O. Kze. Rev. Gen.* i, 101 (1891).

A much branched shrub usually 1—1·5 m. high, with puberulous branchlets. Leaves 0·8—2 cm. long, alternate, erect-spreading, linear- or oblong-lanceolate, elliptic- or oblanceolate-oblong, mucronate, tapering shortly at the base, slightly convex or flat above, somewhat thickened and gland-crenate at the margin, puberulous or glabrous, with the nerve often raised beneath, and with many glands in rows or scattered. Flowers in terminal clusters. Peduncles 5—7 mm. long, puberulous, ebracteolate. Sepals 2·5—4 mm. long, lanceolate or ovate-lanceolate, often attenuate, obtusely keeled, puberulous or glabrous except for minute cilia. Petals 4—5 mm. long, elliptic, very obtuse, cuneate and usually puberulous above at the base, often with several large glands beneath. Stamens glabrous. Staminodes 1·5 mm. long, linear-oblong or oblong-lanceolate, truncate, emarginate, with a large gland behind the apex, flat or slightly concave and puberulous above. Ovary glabrous, or pubescent on the apex, with 3 or rarely 4 carpels bearing oblong glabrous or puberulous processes. Style glabrous.

ALBANY DIV.: hills near Grahamstown, *MacOwan* 797 (type of *A. gnidioides* var. *glabrifolia* in Albany Mus. and S. Afr. Mus. Herb.); Houns- low, *Galpin* 76.—HUMANSDORP DIV.: Humansdorp, *Acocks* 13702; Enon, *Thode* A 1098, in Natal Herb. 17777; east end of Baviaans Kloof, *Levy* 9132; between Combrinck and Bok Kraal, *Fourcade* 5154; Kleinfontein, *Forest Dept.*, *Port Elizabeth* 164.—UITENHAGE DIV.: Winterhoek Mts., *Ecklon and Zeyher* 814, *Krauss* (type of *Barosma mucronata* in Stockholm), *Drège* 7089, *Fries, Norlindh and Weimarck* 1177; Elands River, *Zeyher* 2161; Uitenhage, *Paterson* 2333, *Thode* A 2618, *Zeyher* 371; Paarde Poort, *Bolus* 1876; Sandfontein, *Zeyher* 285 (type of *A. barosmoides* in Stockholm, cotypes in Kew Herb. and S. Afr. Mus. Herb.); Addo Road, *Long* 206.

Flowering April—Oct.

32. **A. acutissima** *Dümmer in Fed. Rep.* xi, 332 (1912)! **A. cryptocarpa** *Fourcade in Trans. Roy. Soc. S. Afr.* xxi, 98 (1932)! **A. phyllicoides** *Fourcade l. c.*

A shrublet with puberulous or glabrous branchlets. Leaves 0·5—1

cm. long, alternate, erect-spreading, linear, lanceolate or ovate-lanceolate, mucronate, rounded or subcordate at the base, convex above, revolute and glandular at the margin, puberulous or glabrous. Flowers in terminal clusters. Peduncles 2—4 mm. long, glabrous, puberulous or pubescent, ebracteolate. Sepals 1.75—2.5 mm. long, ovate-lanceolate, acute, \pm ciliate or glabrous. Petals 3—4 mm. long, elliptic or ovate-elliptic, very obtuse, cuneate at the base, minutely pubescent above on the lower half. Stamens glabrous. Staminodes 1.5 mm. long, linear or lanceolate-linear, \pm emarginate at the apex, concave and puberulous above, with a gland behind the apex. Ovary glandular, glabrous, with 3 carpels bearing oblong processes. Style glabrous.

HUMANSDORP DIV.: hills between Hankey and Loerie, *Fourcade* 3638 (type of *A. cryptocarpa*, in Bolus Herb.), 3638a (type of *A. phyllioides*, in Bolus Herb.); Kabeljauws River, hills east of drift, *Fourcade* 2718.—UITENHAGE DIV.: near Loerie, *Rodin* 1087; Galgebosch and Melkhoutfontein, *Burchell* 4777 (type of *A. acutissima*, in Kew Herb.).

Flowering Aug., Sept. The affinity is with *A. apiculata* G. F. W. Mey. and *A. pilifera* Schldl.

33. *A. mucronulata* Sond. in *Harv. and Sond. Fl. Cap.* i, 417 (1860)!; *Dümmer in Fed. Rep.* xi, 403 (1912). *Hartogia mucronulata* O. Kze. *Rev. Gen.* i, 101 (1891). *A. mucronulata* var. *Rudolphii* *Dümmer in Ann. Bolus Herb.* iii, 55 (1920)!

Branchlets puberulous. Leaves 3.5—6 mm. long, alternate, erect-spreading, often slightly recurved above the middle, rotund or orbicular, shortly cuneate or rounded at the base, with a \pm recurved mucro, slightly concave above, usually somewhat thickened at the margin, slightly convex and with large scattered glands beneath usually extending to the margin, entirely glabrous or minutely puberulous. Flowers in terminal clusters. Peduncles 3—4 mm. long, pubescent or puberulous, ebracteolate. Sepals 2—3 mm. long, widely oblong or widely obovate, narrowing to an apiculus, widely membranous at the margin, rounded and glabrous or pubescent beneath. Petals 4—4.5 mm. long, obovate or obovate-oblong, obtuse, cuneate at the base, puberulous above near the base. Stamens glabrous. Staminodes 1.5—2.5 mm. long, linear, emarginate, concave above, pubescent on the margin. Ovary with 3 carpels bearing rotund hispid or glabrous processes. Style glabrous.

UNIONDALE DIV.: foothills of Kouga Mts. at Braam River, *Esterhuysen* 16323.—WILLOWMORE DIV.: Swanepoels Poort Berg, *Drège* 7123 (type of *A. mucronata* in Stockholm, cotype in Kew Herb.), *Marloth* 4128 (type of var. *Rudolphii* in National Herb., cotypes in Bolus Herb. and S. Afr. Mus. Herb.); mountains west of Miller Station, *Andreae* 1014.

Flowering Sept., Oct. This species is retained with some doubt. The affinity is very close with *A. Martiana*. The characters of the sepals, used for distinction in the present key, may be such as have developed in arid conditions of soil and climate.

34. **A. pungens** comb. nov. **Barosma pungens** E. Mey. ex Sond. in *Harv. and Sond. Fl. Cap.* i, 397 (1860)!

A much branched shrub 30—60 cm. high, with branches retaining the bracts and bracteoles of previous flowering periods. Branchlets pubescent. Leaves mostly 1—1.5 cm. long, sometimes up to 3 cm. long, opposite or alternate, crowded, erect-spreading or spreading, often slightly recurved, lanceolate or linear-lanceolate, acuminate, sharply mucronate, rounded at the base, distinctly concave above, slightly thickened at the margin, rounded and with scattered and marginal glands beneath, ciliate at the base. Flowers axillary, 1—3 together. Peduncles 4—5 mm. long, glabrous, subtended by 2 oblong ciliolate bracteoles. Sepals 1.75 mm. long, linear-lanceolate, obtuse, convex beneath, ciliate. Petals 3.75 mm. long, elliptic or ovate-elliptic, rounded at the apex, widely cuneate at the base, glabrous. Stamens glabrous. Staminodes 1.25 mm. long, lanceolate, gland-tipped, concave above, ciliate. Disk crenulate. Ovary glabrous, with 2 carpels bearing oblong obtuse warted processes. Style glabrous.

PRINCE ALBERT DIV.: Klaarstrom, *Drège* (cotypes in Kew Herb., S Afr. Mus. Herb. and Stockholm).—UNIONDALE DIV.: Hoopsberg, north slopes near the summit, *Esterhuysen* 6552; Kamanassie Mts., Mannetjieberg, *Esterhuysen* 4712, 16468.

Flowering Nov. A remarkable species, quite unlike any other in appearance, and resembling some species of *Cliffortia*.

35. **A. Martiana** Sond. in *Harv. and Sond. Fl. Cap.* i, 416 (1860)!; *Dümmer in Fed. Rep.* xi, 403 (1912). **Hartogia Martiana** O. Kze. *Rev. Gen.* i, 101 (1891). **A. Bowiei** *Dümmer op. cit.* 401!

Branchlets puberulous. Leaves 3—7 mm. long, alternate, erect-spreading, elliptic, ovate or rotund, mucronate, rounded or sub-cuneate at the base, slightly convex above or almost flat, slightly recurved and gland-crenulate at the margin, glabrous, or minutely ciliate in the lower half, usually with 2 or 3 rows of conspicuous glands beneath on either side of the slightly raised nerve. Flowers in terminal clusters. Peduncles 4—7 mm. long, villous, ebracteolate. Sepals 2—3 mm. long, reflexed, oblong or oblong-lanceolate, acute or obtuse, sometimes apiculate, concave above in the upper half, pubescent above and beneath in the lower half, ciliate, sometimes with a wide membranous margin. Petals 3.5—4.5 mm. long, elliptic or elliptic-oblong, very obtuse, widely cuneate and

puberulous above at the base, with 2 rows of conspicuous glands beneath. Stamens glabrous. Staminodes 1.5 mm. long, oblong- or linear-lanceolate, obtuse or truncate, with a large gland behind the apex, puberulous above or pubescent at the margin. Ovary glabrous, with 3 or sometimes 4 carpels bearing rotund processes. Style glabrous.

South Africa: without precise locality or name of collector (type of *A. Bowiei* in Kew Herb.); without precise locality, *Niven* (type of *A. Martiana* in Stockholm).—HUMANSDORP DIV.: near Wagenbooms Station, north side of Kromme River, *Burchell* 4851; Zuur Anys, *Fourcade* 3025; between Assegai Bush and Essenbosch, Kromme River, *Fourcade* 2212; Kouga River, drift on road from Zuur Anys, *Fourcade* 3025a; Groot Hoek, *Fourcade* 742.

Flowering July—Sept. The affinity is clearly with *A. puberula*, the two species possessing many similar characters.

36. *A. spinosa* Sond. in *Harv. and Sond. Fl. Cap.* i, 417 (1860)!; *Dümmer in Fed. Rep.* xi, 403 (1912). *Hartogia spinosa* O. Kze. *Rev. Gen.* i, 102 (1891).

Branchlets pubescent. Leaves mostly 4—6 mm. long, alternate, spreading or somewhat recurved, widely ovate, rounded at the base, terminating in a long, sharp and usually straight mucro, slightly concave and smooth above, distinctly thickened, cartilaginous and pale at the margin, ecarinate, with scattered glands beneath, glabrous, or minutely puberulous on the margin. Flowers in terminal clusters. Peduncles 2—2.5 mm. long, pubescent, ebracteolate. Sepals 2—3 mm. long, ovate, tapering to a pungent apex, ciliolate, obtusely keeled, often pubescent beneath at the base, with a few glands near the keel. Petals 4—5 mm. long, elliptic or obovate, very obtuse and cucullate at the apex, cuneate at the base, puberulous above in the lower half. Stamens glabrous. Staminodes 2—2.5 mm. long, narrowly oblanceolate-linear, truncate, concave and pubescent above, glabrous or almost so beneath, with a conspicuous narrowly conical gland behind the apex. Ovary pubescent, with 2 carpels bearing obovate puberulous processes. Style glabrous. Fruit pubescent, with horizontal ridges, raised glands and linear-oblong emarginate processes.

South Africa: without precise locality, *Drège* 7153 (type, in Stockholm), Mund in Kew Herb.—UNIONDALE DIV.: Uniondale, *Paterson* 3065; hills north-east of Avontuur, *Fourcade* 4608; Hoopsberg, lower south slopes, *Esterhuysen* 6537.

Flowering Sept.—Nov. A close affinity with *A. recurvifolia* suggests that further collecting may provide material with characters connecting the two species.

37. **A. pilifera** Schldl. in *Linnaea* vi, 206 (1830)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 414 (1860) excl. syn. Spreng.; *Dümmer in Fed. Rep.* xi, 332 (1912). **Diosma pilifera** Steud. in *Flora* 1830, p. 549. **Hartogia pilifera** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets pubescent or puberulous. Leaves usually 4—6 mm. long, alternate, erect-spreading, ovate, elliptic, elliptic-oblong, ovate-oblong or sometimes oblong-lanceolate, subacute, with a slender incurved mucro, rounded or subcordate at the base, slightly convex or flat above, gland-crenate and slightly revolute at the margin, glabrous or at first minutely puberulous, sometimes with 1—4 scattered glands and a slightly raised nerve beneath. Flowers in terminal clusters. Peduncles 3 mm. long, puberulous, ebracteolate. Sepals 1.5—2 mm. long, oblong, or oblong-spathulate, obtuse, acute or mucronate, or considerably widened and subfoliaceous or subtrilobed in the upper half, sometimes ciliate on the lower half, with conspicuous glands beneath, often puberulous on the lower half. Petals 2.5 mm. long, elliptic, obtuse, cuneate at the base, puberulous beneath on the lower half. Stamens glabrous. Staminodes 0.75—1 mm. long, linear, semi-cylindric, tipped with a conical gland, pubescent above on the upper half. Ovary glabrous, with 3 carpels bearing rotund processes. Style glabrous.

HUMANSDORP DIV.: Loerie Plantation, *Dix* 70.—PORT ELIZABETH DIV.: Port Elizabeth, *Brunt* 248.—UITENHAGE DIV.: Winterhoek Mt., *Ecklon and Zeyher* 884 (cotypes in Kew Herb., S. Afr. Mus. Herb. and Stockholm), *Fries, Norlindh and Weimarck* 1076; Elands River Mts., *Forest Dept. Herb.* 2232.

Flowering Sept., Oct. The occasional leaf-like sepals are a remarkable feature of this species.

38. **A. Mundtii** Cham. and Schldl. in *Linnaea* v, 56 (1830)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 412 (1860). **A. Niveni** *Sond. op. cit.* 412! **Hartogia Mundtii**, **H. Niveni** O. Kze. *Rev. Gen.* i, 101 (1891). **Agathosma Taskerae** *Dümmer in Fed. Rep.* xi, 402 (1912)! **A. Pillansiana** *Dümmer in Ann. Bolus Herb.* iii, 53 (1920)! **A. Sonderiana** *Dümmer op. cit.* 50! **A. Tugwelliae** *Dümmer op. cit.* 56!

Branchlets puberulous or pubescent with retrorse hairs. Leaves 0.4—1 cm. long, alternate, erect-spreading or spreading, elliptic, lanceolate-, oblanceolate- or elliptic-oblong, acute, subacute or obtuse, rounded or cuneate at the base, convex and glabrous or puberulous above, revolute and with conspicuous glands at the margin, glabrous or puberulous beneath, with a prominent nerve and few or no glands. Flowers in terminal or axillary clusters. Peduncles 2.5—5 mm. long, puberulous or glabrous, ebracteolate. Sepals 0.5—1.5 mm. long, ovate, deltoid- or

oblong-ovate, or ovate-lanceolate, obtuse, glabrous or partly puberulous above, ciliate or edged with stalked glands, obtusely keeled and puberulous or glabrous beneath. Petals 3—4.5 mm. long, elliptic, oblong-elliptic, oblong-obovate or oblong-oblancoelate, obtuse, cuneate or oblong at the base, puberulous above on the lower half or glabrous. Stamens glabrous. Staminodes 0.75—1.75 mm. long, narrowly linear, subulate, oblancoelate-, elliptic- or linear-oblong, tipped with a conical or subulate gland, furrowed above, \pm ciliate, sometimes pilose above and beneath. Ovary glabrous, or setose on the upper half, with 2 carpels bearing rotund processes. Style glabrous.

South Africa: without precise locality, *Mund and Maire* (cotype of *A. Mundtii* in Stockholm).—GEORGE DIV.: hills south of Schoonberg, *Fourcade* 3411; Devil's Kop, *Niven* 13 (type of *A. Niveni* in Stockholm, cotypes in Brit. Mus. Herb. and Kew Herb.); Montagu Pass, *Fourcade* 1610, 4745, *Schlechter* 5812 (type of *A. Sonderiana* in Bolus Herb., cotypes in Albany Mus. and Kew Herb.).—HUMANSDORP DIV.: Tuschen Bij, *Fourcade* 479; hills 5 miles north of Humansdorp, *Fourcade* 2225; Kromme River Dam, *Fourcade* 6042; Kouga River Drift, on road from Zuur Anys, *Fourcade* 3087.—LADISMITH DIV.: Roodeberg, *Esterhuysen* 17158, *Lewis* in S. Afr. Mus. Herb. 57802, *Compton* 21473; near Ladismith, *Esterhuysen* 13988, *Levyms* 2076, 4202, 6102, 9047; Seven Weeks Poort, *Levyms* 2474.—LAINGSBURG DIV.: Wittepoort, *Walgate* 348.—OUDTSHOORN DIV.: without precise locality or collector, Bolus Herb. 13759 (type of *A. Pillansiana*, cotype in S. Afr. Mus. Herb.); Zwartberg Pass, *Krige* in Bolus Herb. 13432 (type of *A. Tugwelliae*), *Levyms* 6657, 9128, *Stokoe* 9290.—UNIONDALE DIV.: Long Kloof, mountain sides near west bank of Wagenboom River, *Burchell* 4928 (type of *A. Taskerae* in Kew Herb.); Outeniqua Mts., north slopes near Joubertina, *Esterhuysen* 6907, 10644, *C. J. Esterhuysen* Bolus Herb. 23973; Georgida, *Esterhuysen* 6390; Kouga Mts., peak east of Smutsberg, *Esterhuysen* 7008, 10714; Kouga Peak, *Esterhuysen* 16287; Kouga Hills, *Esterhuysen* 6702.

Flowering June—Nov. The dorsiventral leaves, the occurrence of axillary flower-clusters, the almost clawless petals and the comparatively under-developed staminodes indicate close affinity with the more primitive species.

39. *A. elegans* Cham. in *Linnaea* v, 54 (1830)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 422 (1860). *Gymnonychium pubescens* Bartl. in *Linnaea* xvii, 354, t. xi (1843)! *A. pubescens* *Sond. op. cit.* 413; *Dümmer in Fed. Rep.* xi, 331 (1912). *Hartogia elegans*, *H. pubescens* *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets pubescent. Leaves usually 0.5—1 cm. long, alternate,

erect-spreading, oblong, elliptic-oblong, oblong- or ovate-lanceolate, obtuse or subacute, rounded or subcordate at the base, \pm concave and glabrous or hispid above, slightly revolute, somewhat crenate, with marginal glands, rarely with stalked glands on the margin, glabrous, or \pm hispid beneath, with a slightly raised nerve. Flowers in terminal clusters. Peduncles 2—3 mm. long, puberulous, subtended by bracteoles. Sepals 1.25—1.5 mm. long, ovate-lanceolate, obtuse or subacute, usually puberulous above on the upper half, convex and puberulous beneath, with a slightly raised nerve. Petals 3—3.5 mm. long, elliptic-oblong or obovate, obtuse, tapering to a narrowly cuneate base, ciliate or puberulous above on the lower half. Stamens glabrous. Staminodes 1.25—2 mm. long, slightly recurved, linear, tapering towards both ends, gland-tipped, involute and ciliate at the margin. Ovary puberulous on the apex, with 2 carpels, or sometimes 1 carpel, bearing rotund setose processes. Style glabrous.

South Africa: without precise locality, *Mund and Maire* (cotypes of *A. elegans* in Kew Herb. and Stockholm), Niven (cotype of *A. pubescens* in Stockholm).—GEORGE DIV.: Montagu Pass, *Compton* 7174, 7418, 7419, 7586, 7589, *Fourcade* 3250, 6404, *Rogers* 4310, *Schlechter* 5784, *Thode* A2405; Bergplaats, "Korbonaatjes Kraal," *Laughton* 144.—KNYSNA DIV.: Jonkersberg, *Keet* 1039, *J. Phillips* 1087.—RIVERSDALE DIV.: Garcia's Pass, *Esterhuysen* 17223.—UNIONDALE DIV.: Helpmekaar Peak, *Esterhuysen* 4566.

Flowering Jan.—Dec.

40. ***A. blaerioides*** *Cham. in Linnaea*, v, 55 (1830)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 413 (1860); *Dümmer in Fed. Rep.* xi, 331 (1912). ***Hartogia blaerioides*** *O. Kze. Rev. Gen.*, i, 101 (1891).

Branchlets pubescent or puberulous. Leaves 3—6 mm. long, alternate, erect-spreading or spreading, incurved, lanceolate, ovate-lanceolate, elliptic or ovate, subacute or obtuse, rounded or subcordate at the base, concave and puberulous or hispid above, \pm revolute and usually with stalked glands at the margin, puberulous or glabrous and eglandular beneath, with large glands on the recurved margin. Flowers in terminal clusters. Peduncles 2—2.5 mm. long, puberulous or shortly pubescent, subtended by bracteoles. Sepals 1.5—1.75 mm. long, oblong, obovate or oblong-obovate, obtuse, slightly keeled and puberulous or shortly pubescent beneath, sometimes with stalked marginal glands. Petals 2.5—3.5 mm. long, obovate or obovate-elliptic, very obtuse, long-cuneate towards the base, often sparsely pubescent above near the base, with several glands beneath. Stamens glabrous. Staminodes 1.5—2 mm. long, subulate or lanceolate-linear, slightly concave and pubescent above,

tipped with an elliptic gland. Ovary puberulous on the apex, with 2 carpels bearing rotund processes. Fruit pubescent except on the processes.

GEORGE DIV.: Olifants River, *Dr. Gill*.—OUDTSHOORN DIV.: Robinson's Pass, *Taylor* in Bolus Herb. 10586, *Salter* 6350, *Hops* 99, *Compton* 19603.—RIVERSDALE DIV.: Kampsche Berg, *Muir* 3328.—UNIONDALE DIV.: Long Kloof Mts., Mordkuils Hoogte, *Mund and Maire* (cotype in Stockholm); Prince Alfred's Pass, *Fourcade* 1287, 1287a, 3792, *Salter* 6730, *Schönland* 3409; Helpmekaar Peak, *Compton* 4594, 10457, *Esterhuysen* 4566; west of Lauterwater, Many Waters Kloof, *Compton* 5159, 7179; Avontuur, *Compton* 10790.

Flowering April—Jan.

41. **A. apiculata** G. F. W. Mey. in *Bartl. and Wendl. Diosm.* 176 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 414 (1860); *Dümmer in Fed. Rep.* xi, 332 (1912) incl. var. *algoensis*. **Diosma apiculata** Spreng. *Syst. Veg.* i, 787 (1825). **Barosma apiculata** Eckl. and Zeyher, *Enum.* 104 (1835)! **Agathosma aristata** Presl, *Bot. Bemerk.* 32 (1844) absque descr. **Hartogia apiculata** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets pubescent or glabrous. Leaves 2·5—8 mm. long, alternate, spreading or reflexed, oblong- or ovate-lanceolate, ovate or sometimes cordate, acute or obtuse, with a slightly recurved awn-like mucro, rounded or \pm cordate at the base, convex above, sometimes with a raised nerve, glabrous, often furrowed beneath, with the glands usually confined to the margin. Flowers in terminal clusters. Peduncles 1—4 mm. long, puberulous or pubescent, ebracteolate. Sepals 1·5—3 mm. long, lanceolate or ovate-lanceolate, mucronulate or mucronate, slightly keeled on the upper half, glabrous. Petals 3·5—4 mm. long; blade obovate or ovate, obtuse, ciliolate at the base; claw almost as long, linear-oblong, puberulous above, ciliolate. Stamens glabrous. Staminodes 2·5 mm. long, linear, acuminate, gland-tipped, ciliolate. Ovary with many long-stalked glands on the upper half, with 3 carpels bearing rotund processes. Style glabrous. Fruit reticulately ridged, with linear-oblong processes.

BATHURST DIV.: Kasouga, *Britten* 2368; Port Alfred, *Rogers* 27480, *Schönland* 785; Kowie West, *Britten* 2665.—GEORGE DIV.: hills east of Great Brak River, *Fourcade* 6006; the Wilderness, *Compton* 15829, *Levy's* 777, 5006; Great Brak River, *Schlechter* 5745.—HUMANSDORP DIV.: Witte Els Bosch, seashore, *Fourcade* 1379; Slang River, *Phillips* 3344; near the coast, *Duthie* 1098, *Rogers* 3083; near Humansdorp, *Kennedy* in S. Afr. Mus. 1447; dunes between Kromme and Slang rivers, *J. Sim* 6.—KNYSNA DIV.: Goukamma, *Compton* 7559; between Goukamma River and Melkvei, *Burchell* 5609; Plettenberg Bay, *Burchell* 5309, *Michell* in Bolus Herb. 16085; Buffalo Bay, *Keet* 880, *Levy's*

7884; Keurboom River, near the mouth, *Fourcade* 227.—**MOSSEL BAY** Div.: near mouth of the Gouritz River and at Fish Bay, *Drège* 7118; Mossel Bay, *Zeyher* in S. Afr. Mus. Herb. 14463, *Rogers* 4173.—**PORT ELIZABETH** Div.: Humewood, *Compton* 13164, *Paterson* 784, 1091, *Potts* 300; dunes near the shore, *Bolus* 2223, *Burchell* 4289, 4305; Redhouse, *Long* 1072, *Paterson* 1133; near Cape Recife, *Ecklon* 207, *Ecklon and Zeyher* 815; Schoenmakers Kop Road, *Holland* 3622.—**RIVERSDALE** Div.: Still Bay and Melkhoutfontein, limestone hills and dunes, *Muir* 3116.—**UITENHAGE** Div.: Van Staadens, *Long* 660, *Letty* 149, *Paterson* 1091, 2671.

Flowering April—Jan.

42. **A. recurvifolia** *Sond. in Harv. and Sond. Fl. Cap.* i, 415 (1860)!; *Dümmer in Fed. Rep.* xi, 402 (1912). **A. acutifolia** *Sond. op. cit.* 416! **Hartogia acutifolia**, **H. recurvifolia** *O. Kze. Rev. Gen.* i, 101 (1891). **Agathosma pubicalyx** *Dümmer op. cit.* 401!

Branchlets puberulous. Leaves 2—7 mm. long, alternate, erect-spreading, elliptic, ovate or rotund, mucronate or mucronulate, rounded at the base, concave above, with a distinctly thickened pale and eglandular margin, with an inconspicuous nerve and many scattered glands beneath, entirely glabrous or puberulous. Flowers in terminal clusters. Peduncles 2—5 mm. long, glabrous or puberulous, ebracteolate. Sepals 1—1.5 mm. long, ovate or oblong, obtuse or subacute, convex and glabrous or puberulous beneath, with a callus behind the apex. Petals 3.5—4.5 mm. long, obovate, oblong-obovate or oblong-elliptic, obtuse, cuneate at the base, puberulous above on the lower half, often with a few glands beneath on the upper half. Stamens glabrous. Staminodes 1.5—2.5 mm. long, linear or oblong, concave and puberulous above, tipped with a conical gland. Ovary glabrous or puberulous, with 2 carpels bearing rotund processes. Style glabrous.

South Africa: without precise locality, *Roxburgh* (type of *A. pubicalyx* in Brit. Mus., cotype in Kew Herb.).—**MOSSEL BAY** Div.: Robinson Pass, *Compton* 19601.—**PRINCE ALBERT** Div.: Sand River Mts., *Marloth* 4328; Klaarstrom, *Drège* 7124 (type of *A. recurvifolia* in Stockholm, cotype in Kew Herb.).—**UNIONDALE** Div.: Slypsteenberg, *Esterhuysen* 6335; Joubertina, *Esterhuysen* 10624, *C. J. Esterhuysen* in *Bolus* Herb. 23966; Kouga, near Misgund, *Compton* 7420, *Esterhuysen* 6709, 6954; foothills near Smutsberg, *Esterhuysen* 10713; Ongelegen, *Fourcade* 4872.—**WILLOWMORE** Div.: Aasvogelberg, *Drège* 7125 (type of *A. acutifolia* in Stockholm, cotype in Kew Herb.), *Marloth* 14158, *Andrae* 964.

Flowering May—Nov.

43. **A. fraudulenta** *Sond. in Harv. and Sond. Fl. Cap.* i, 415 (1860)! **Hartogia fraudulenta** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets velvety-puberulous. Leaves 0·7—1·2 cm. long, alternate, ascending, cuneate-obovate, obtuse or subacute, cuneate at the base, \pm convex above, slightly thickened and crenulate at the margin, with a raised nerve and large scattered glands beneath, minutely velvety-puberulous above and beneath. Flowers in terminal clusters, the lower subtended by subfoliaceous bracts. Peduncles 0·6—1 cm. long, puberulous, subtended by bracteoles. Sepals 4 mm. long, lanceolate-linear, obtuse, gland-tipped, recurved in the upper half, puberulous above and beneath. Petals 5 mm. long, elliptic-oblong, obtuse, cuneate at the base, puberulous above in the lower half, with large glands scattered beneath. Stamens glabrous. Staminodes 1·75 mm. long, linear-oblong, truncate, dorsally compressed, puberulous beneath, with a large apical gland. Ovary puberulous, with 3 carpels bearing oblong processes terminating in a large gland.

Locality and collector unknown. The type is in Sonder's Herbarium, now in the Riks. Mus., Stockholm. It is accompanied by a slip of paper on which is written "No. 26. *Adenandra*" in a handwriting not recognised.

44. *A. planifolia* Sond. in *Harv. and Sond. Fl. Cap.* i, 413 (1860)! *Hartogia planifolia* O. Kze. *Rev. Gen.* i, 101 (1891). *Agathosma sessilipetala* Dümmer in *Fed. Rep.* xi, 337 (1912)! incl. var. *A. Keetii* Dümmer in *Ann. Bolus Herb.* iii, 52 (1920)!

Branchlets pubescent or puberulous. Leaves 3—7 mm. long, alternate, erect-spreading, ovate- or obovate-oblong or ovate, obtuse, rounded or subcordate at the base, slightly convex, flat or slightly concave and glabrous or hispidulous above, with a thickened slightly revolute and eglandular margin, sometimes sparsely ciliate, glabrous or puberulous beneath, with a slightly raised nerve and small scattered glands. Flowers in terminal clusters. Peduncles 3—4 mm. long, puberulous, ebracteolate. Sepals 1·5 mm. long, oblong or oblong-lanceolate, obtuse, ciliate, often with a few setaceous hairs at the apex, slightly keeled beneath. Petals 3·5—4 mm. long, obovate or elliptic-ovate, obtuse, cuneate at the base, sparsely puberulous above near the base, with a few glands beneath. Stamens glabrous. Staminodes 1 mm. long, linear or lanceolate-linear, with a conical gland behind the apex, slightly involute at the margin, minutely ciliate on the lower half. Ovary minutely setose on the apex, with 2 carpels bearing rounded processes. Style glabrous.

South Africa: without precise locality, *Niven* (type of *A. planifolia* in Stockholm), *Roxburgh* 3 (type of *A. sessilipetala* in Brit. Mus., cotype in Kew Herb.).—KNYSNA DIV.: *Plaats Bosch*, *Keet* in Forest Dept. Herb. 2386 (type of *A. Keetii* in Bolus Herb.); *Van der Walt's Hoek*, *Keet* 1070; *Hoogeberg*, *Keet* 993.

Flowering Jan.

45. **A. ovalifolia** nom. nov. **A. acuminata** E. Mey. in *Drège Zwei Pfl. Doc.* 65 (1844) nomen, non Willd. **A. Meyeriana** Presl, *Bot. Bemerk.* 32 (1844)! nomen.; *Walpers, Ann.* i, 155 (1848) nomen. **A. punctata** Sond. in *Harv. and Sond. Fl. Cap.* i, 417 (1860)! non G. Don. **Hartogia punctata** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets puberulous. Leaves 4—5 mm. long, alternate, erect-spreading, slightly recurved at the apex, elliptic, widely ovate or subrotund, obtuse or with a short blunt mucro, slightly concave above, often somewhat thickened and pale at the margin, widely convex and hispidulous beneath, with large scattered glands extending to the margin. Flowers in terminal clusters. Peduncles 4 mm. long, puberulous, ebracteolate. Sepals 1.5 mm. long, oblong, obtuse, ciliate, convex behind the apex, with prominent glands beneath, puberulous on the lower half. Petals 4.5 mm. long, elliptic-oblong, obtuse, cuneate at the base, ciliate, puberulous above near the base. Stamens glabrous. Staminodes 2.5 mm. long, linear, truncate, tipped with a rotund gland, concave above, ciliate. Ovary puberulous about the apex, with 2 carpels bearing rounded hispid processes. Style glabrous.

PRINCE ALBERT DIV.: north of Klaarstrom, "Middelwater," rock crevices, *Levyns* 6617.—WILLOWMORE DIV.: Witte Poort Mts., *Drège* 7122 (type of *A. punctata* in Stockholm, cotypes in Bolus Herb. and Kew Herb.).

Flowering Aug., Sept.

46. **A. clavisepala** R. A. Dyer in *Kew Bull.* 1934, p. 270!

Branchlets puberulous or with reflexed pubescence. Leaves 3.5—5 mm. long, alternate, erect-spreading, spreading or slightly reflexed, oblong, ovate-oblong, elliptic, ovate-elliptic or sometimes ovate, obtuse or subacute, rounded at the base, glabrous, convex or almost flat above, slightly recurved and with conspicuous glands at the margin, usually with a raised nerve beneath. Flowers in terminal clusters. Peduncles 3 mm. long, glabrous or with reflexed pubescence, subtended by ovate-lanceolate bracteoles. Calyx glabrous or puberulous; sepals 1.5 mm. long, ovate-oblong, very obtuse and swollen behind the apex, or deltoid-ovate in the lower half and clavate in the upper half, slightly keeled beneath, ciliate. Petals 3—4 mm. long, elliptic- or ovate-oblong, very obtuse, cuneate at the base, puberulous above on the lower half, ciliate from the middle downwards. Stamens glabrous. Staminodes 1.5 mm. long, oblong-lanceolate, concave above, puberulous beneath, subquadrate and glabrous at the base, tipped with an acute gland. Ovary glabrous, with 2 carpels bearing rotund processes. Style glabrous.

ALBANY DIV.: near Sidbury, "Rockcliffe," *Daly* 822; near Salem,

Wilmot in National Herb. 15304 (type, cotypes in Lund and Stockholm).—ALEXANDRIA DIV.: Zuurborg, above Slangboom, *Rennie* 458.—BATHURST DIV.: Hopewell, *Acock* 11138; Southwell, *Britten* 2244.

Flowering June—Sept.

47. **A. odoratissima** comb. nov. *Diosma odoratissima* *Montin in Phys. Sallsk. Handl.* i, 104 (1776). **D. latifolia** *Linn. f. Suppl.* 154 (1781); *Thunb. Prodr.* 84 (1794); *Gmelin, Syst. Veg.* ii, 409 (1796); *Thunb. Diss. Diosm.* 15 (1797); *Murr. Syst. Veg.* 250 (1797); *Willd. Sp. Pl.* i, 1138 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Ait. Hort. Kew.* ed. 2, ii, 32 (1811) excl. syn. *Andr.*; *Thunb. Fl. Cap. ed. Schultes* 229 (1823); *DC. Prodr.* i, 714 (1824) excl. syn. *Andr.*; **D. betulina** *Lam. Encycl. Meth.* ii, 288 (1786) non *Thunb.* **Baryosma latifolia** *Roem. and Schultes, Syst. Veg.* v, 449 (1819) excl. syn. *Andr.* **Barosma pulchra** *Cham. and Schldl. in Linnaea* v, 53 (1830). **B. alpina** *Eckl. and Zeyher, Enum.* 102 (1835)! **B. latifolia** *Sond. in Harv. and Sond. Fl. Cap.* i, 394 (1860). **B. pulchella** var. **major** *Sond. l. c.*!

A stoutly wiry much branched shrub about 1 m. high, with pubescent branchlets. Leaves 0.5—1.5 cm. long, alternate or ternate, usually crowded, erect-spreading, ovate or lanceolate, obtuse, rounded at the base, flat, slightly concave or convex above, gland-crenate, often slightly revolute at the margin, sparsely pubescent in some parts or glabrous, sometimes with conspicuous veins beneath, with glands confined to the margin. Flowers 1—2 together, axillary. Peduncles usually 0.5—1 cm. long, glabrous or very sparsely pubescent, subtended by spatulate-oblong bracteoles. Sepals 1.25—1.5 mm. long, ovate or ovate-oblong, very obtuse, concave above, ciliolate, with several large glands beneath. Petals 4—5 mm. long, ovate, ovate- or elliptic-oblong, very obtuse, shortly cuneate at the base, concave in the upper half, ciliolate near the base, with several conspicuous glands beneath. Stamens glabrous, or very sparsely pubescent on the filaments. Staminodes 2.5—3.25 mm. long, linear, lanceolate-linear or linear-oblong, tapering to a gland-tipped apex, sparsely pubescent beneath, \pm ciliate. Disk fleshy, crenulate. Ovary shortly stipitate, glabrous or sparsely pubescent, usually with 4, sometimes with 3 or 5, warted carpels bearing widely oblong or ovate processes. Style glabrous.

CALEDON DIV.: Landdrost Kop, *Stokoe* 7663; Somerset Sneeuwkop, *Esterhuysen* 1850, *Marloth* 1841, *Stokoe* in S. Afr. Mus. Herb. 58814.—CERES DIV.: near Ceres, *Bolus* 24459; Hansies Berg, *Compton* 16707, *Lewis* in S. Afr. Mus. Herb. 59368; Conical Peak, *Stokoe* 7664, in S. Afr. Mus. Herb. 59374; Castle Rocks, *Esterhuysen* 14163; Laaken Vlei, *Phillips* 1957; Mostertshoek Twins, *Esterhuysen* 9864, *Wasserfall* 802; Olifants

River Mts., south of Groen, *Esterhuysen* 13456.—CLANWILLIAM DIV.: Cederberg, *Primos* in Marloth Herb. 11675.—PAARL DIV.: Du Toits Kloof, *Drège* in S. Afr. Mus. Herb. 14384; April Peak, *Compton* 10166, *Esterhuysen* 4100; Wemmershoek Peak, *Andrae* 562, *Esterhuysen* 11246; mountains near French Hoek, *Phillips* 1081, *Schlechter* 9242; French Hoek Peak, *Stokoe* in S. Afr. Mus. Herb. 59373; Bailey's Peak, *Esterhuysen* 1614; Lower Wellington Sneeuwkop, *Esterhuysen* 12433; Winterberg, *Esterhuysen* 9658.—PIKETBERG DIV.: mountains near Saron, *Schlechter* 10685; Twenty Four Rivers Mts., *Esterhuysen* 16175.—RIVERSDALE DIV.: Kampsche Berg, *Burchell* 7084.—ROBERTSON DIV.: Omklaar Mt., *Stokoe* 7083.—SWELLENDAAM DIV.: mountain peak near Swellendam, *Burchell* 7406; Lemoenshoek, *Esterhuysen* 10438, *Thorne* in S. Afr. Mus. Herb. 44532.—TULBAGH DIV.: Witsenberg, *Andrae* 142, *Burchell* 8680 *Zeyher* 284; mountains near Tulbagh, *Ecklon and Zeyher* 803; Nieuwekloof, *Drège* in National Herb. 9200, *Bolus* in Natal Herb. 7382; Winterhoek Mt., *Bolus* 5139, *Ecklon and Zeyher* 806 (cotype of *Barosma alpina* in S. Afr. Mus. Herb. and Stockholm); near Artois, *Bolus* 7579; Great Winterhoek, *Phillips* 1716; Little Winterhoek, *Marloth* 487, 488.—WORCESTER DIV.: Matroosberg, *A. Bolus* in Guthrie Herb. 4396, *Davidson* in S. Afr. Mus. Herb. 32, *Esterhuysen* 14203, *Marloth* 2224, 2359; Bain's Kloof, *Compton* 17495; Du Toit's Peak, *Marloth* 2496; Stettynsberg, *Esterhuysen* 11097; Milner Peak, *Esterhuysen* 8483, 14250, 14902; Slanghoek Mts., *Esterhuysen* 1705, 8631, 9479; *Wasserfall* 640; Waaihoek Mts., *Esterhuysen* 8323; Keeromsberg, *Esterhuysen* 9247; Buffelshoek Peak, *Esterhuysen* 8426, 15138; Brandwacht Peak, *Esterhuysen* 11014; Hex River Mts., Milner Ridge, *Esterhuysen* 9365; Shale Peaks, *Esterhuysen* 8735.

Flowering Aug.—March.

48. **A. Sladeniana** *Glover in Ann. S. Afr. Mus.* ix, 204, t. 8 b (1915)!

A densely branched low shrub with hispid branchlets. Leaves 4—6 mm. long, alternate, ascending, linear-lanceolate, obtuse, slightly incurved at the apex, rounded at the base, concave above, \pm gibbous behind the apex, rounded and with tubercle-based hairs beneath. Flowers in terminal clusters, surrounded by widened scale-like leaves. Peduncles 0.5—1 mm. long, glabrous, ebracteolate. Sepals 2 mm. long, linear or linear-spathulate, obtuse, ciliate. Petals 5 mm. long, linear-spathulate, ciliate on the lower half. Stamens glabrous. Staminalodes 3 mm. long, linear, tapering towards both ends, pilose above at the middle. Ovary with 3 carpels bearing widely rotund hispid processes. Style glabrous.

CLANWILLIAM DIV: Cold Bokkeveld Mts. opposite Warm Baths, *Stephens and Glover* in Sladen Mem. Exped. 7114 (type, in *Bolus* Herb.,

cotype in Kew Herb.); Elands Kloof, west end, *Leighton* 1250; "Modderfontein," *Gillett* 3693; Citrusdal, *Barker* 3769; between Grey's Pass and Clanwilliam, *Leipoldt* 3720; between Grey's Pass and Kranz Kloof, Scherfseheuvensberg, *Leipoldt* in Bolus Herb. 23974.

Flowering Sept., Oct.

49. *A. mirabilis* sp. nov.; ramulis pubescentibus; foliis alternatis oblongo-lanceolatis acutis vel subacutis, supra concavis glandulis, subtus convexis conspicue carinatis primum pilosis; floribus terminalibus sessilibus; sepalis late ovatis obtusissimis concavis ciliolatis; petalis oblanceolatis ciliolatis, basi sparse pubescentibus; staminibus totis pubescentibus; staminodis oblanceolato-oblongis, medium pubescentibus, apice glandula notatis; disco tubiforme lobato membranaceo; ovario 3-loculari cornubus late spatulatis dorse compressis margine pilosis; stylo glabro.

A much branched shrub usually 30—40 cm. high, with erect-spreading branches and pubescent branchlets. Leaves mostly 0.8—1 cm. long, alternate, erect-spreading, oblong-lanceolate, acute or subacute, rounded at the base, concave and gland-warted above, rounded and with a prominent often, at first, pilose nerve beneath, with marginal and scattered glands. Flowers few, solitary at the ends of short leafy branchlets, sessile subtended by an ovate bract and 2 rotund deeply concave bracteoles. Sepals 2 mm. long, widely ovate, rounded at the apex, very concave, ciliate. Petals 8—9 mm. long, oblanceolate, obtuse, slightly concave above, sparsely pubescent at the base, ciliate, with many glands beneath near the nerve. Stamens with pubescent filaments. Staminodes 3 mm. long, oblanceolate-oblong, obtuse, slightly concave above, pubescent and ciliate at the middle, with a round gland behind the apex. Disk embracing the lower part of the ovary, produced into a membranous tube readily splitting into toothed lobes. Ovary glabrous on the lower part, with 3 carpels bearing widely spatulate dorsally compressed erect-spreading processes with hairs on the margin and a few above. Style glabrous. Fruit sparsely pubescent.

CERES DIV.: Michell's Pass, Slab Peak, rock-crevices, *Esterhuysen* 6159; Michell Peak, west side, rock-crevices, *Esterhuysen* 14789.—WORCESTER DIV.: Hex River Mts., shale band above Buffels Dome, *Esterhuysen* 8723 (type, in Bolus Herb.); Milner Ridge Peak, lower south-east slopes, rock-crevices, *Esterhuysen* 7814, 8461; Horseshoe Peak, *Esterhuysen* 8753; Fonteintjiesberg, *Esterhuysen* 8757; Waaihoek, rock-crevices, *Esterhuysen* 8882, 8972; Shale Peaks, rock-crevices, *Esterhuysen* 8449.

Flowering Sept.—March. A very distinct species without any apparent affinity. Remarkable characters are (1) the flowers being sessile

and (2) the disk being produced into a tube splitting into toothed lobes. The type collection has some flowers with 8 petals and pubescent anthers.

50. **A. pulchella** Link, *Enum. Hort. Berol.* i, 238 (1821). **Diosma pulchella** Linn. *Sp. Pl.* ed. 2, p. 288 (1762); *Lam. Encycl. Meth.* ii, 288 (1786); *Ait. Hort. Kew.* i, 276 (1789); *Thunb. Prodr.* 43 (1794); *Gmelin, Syst. Nat.* ed. 13, ii, 409 (1796); *Murray, Syst. Veg.* 25 (1797); *Thunb. Diss. Diosm.* 15 (1797); *Willd. Sp. Pl.* i, 1140 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Ait. Hort. Kew.*, ed. 2, ii, 33 (1811); *Sims in Curtis Bot. Mag.* t. 135 (1811); *Thunb. Fl. Cap. ed. Schultes* 229 (1823) excl. descr. partim.; *DC. Prodr.* i, 714 (1824); *Spreng. Syst. Veg.* i, 785 (1825). **Hartogia pulchella** Berg. *Pl. Cap.* 69 (1767); *Linn. Syst. Nat.* ed. xii, 625 (1767). **Bucco pulchella** Roem. and Schultes, *Syst. Veg.* v, 442 (1819). **Barosma pulchella** Bartl. and Wendl. *Diosm.* 107 (1824) partim; *Sond. in Harv. and Sond. Fl. Cap.* i, 394 (1860) excl. syn. *Licht. et var.*; *Bailey, Standard Cycl. Hort.* i, 454 (1914).

Branchlets pubescent. Leaves 3—6 mm. long, opposite, ternate, quaternate, alternate or scattered, erect-spreading or spreading, ovate or lanceolate-ovate, obtuse or subacute, rounded or subcordate at the base, slightly concave above, crenate and slightly thickened at the margin, glabrous, with 8—16 glands beneath confined to the margin. Flowers 1 or 2 together in the axils of the upper leaves. Peduncles 4·5 mm. long, glabrous, subtended by 2 rotund ciliate bracteoles. Sepals 1 mm. long, widely oblong, very obtuse, ciliolate, convex and with several large glands beneath. Petals 3 mm. long, ovate-oblong, rounded at the apex, widely cuneate at the base, concave above, glabrous. Stamens glabrous. Staminodes 1·5 mm. long, linear-subulate, dorsally compressed, gland-tipped, sparsely ciliolate on the lower half. Disk obscurely crenulate, fleshy. Ovary subsessile, glabrous, studded with glands, with 3 or sometimes 4 carpels bearing oblong obtuse warted processes. Style glabrous, slightly recurved in the upper half.

South Africa: without precise locality, *Niven, Sparrman, Thunberg*.—CAPE DIV.: Table Mt., *Burchell* 595, *Ecklon and Zeyher* 808 partly, *Hafstrom and Acocks* 2174; Echo Valley, *Compton* 16450, *Pillans* 8889.

Flowering Nov. The following may belong here: "*Spiraea capensis spicata serpylli folio margine quesi perforato*" *Ray. App.* 249, No. 67 (1704).

51. **A. stenosepala** sp. nov.; ramulis gracilissimis pubescentibus; foliis alternatis vel oppositis oblongo-lanceolatis obtusis glabris, supra medium concavis, margine convexis; floribus terminalibus; pedunculis pubescentibus ebracteolatis; sepalis lineari-lanceolatis attenuatis obtusis ciliatis; petalis ellipticis vel obovatis, basin ciliolatis; staminibus infra

medium sparse pubescentibus; staminodis lanceolatis obtusis ciliatis, apice glandula stipitata ornatis; ovario glabro 3-loculari, cornubus oblongis obtusis; stylo glabro.

A much branched shrub about 60 cm. high, with very slender pubescent branchlets. Leaves mostly 6—8 mm. long, alternate or sometimes opposite, erect-spreading, oblong-lanceolate, obtuse, rounded or widely cuneate at the base, concave up the middle, convex towards the margin, revolute and with closely set glands at the margin, glabrous, with a prominent nerve beneath and a few glands on or near the nerve. Flowers 1 or 2 together at the ends of short leafy branchlets. Peduncles 2—2.5 mm. long, pubescent, subtended by linear-lanceolate ciliate bracteoles. Sepals 3.5 mm. long, linear-lanceolate, attenuate, obtuse, concave above, ciliate, rounded and with 2 rows of conspicuous glands beneath, sparsely pubescent at the base. Petals 4 mm. long, elliptic or obovate, very obtuse, tapering and ciliate to a wide base, concave above at the apex. Stamens with filaments very sparsely pubescent on the lower half. Stamines 1.5 mm. long, lanceolate, obtuse, slightly concave above, ciliate, tipped with a stalked gland. Disk crenulate. Ovary glabrous, with 3 carpels bearing oblong obtuse processes. Style glabrous.

PAARL DIV.: French Hoek Forest Reserve, *Leighton* in Bolus Herb. 24442 (type), *Esterhuysen* in Bolus Herb. 24443.

Flowering Sept., Oct. This is distinguished from all other species by the narrow sepals. There is no evident close affinity, though, in leaves and habit of growth, it bears a great resemblance to *A. decurrens*.

52. **A. glandulosa** *Sond. in Harv. and Sond. Fl. Cap. i, 420 (1860); Dümmer in Fed. Rep. xi, 407 (1912). Diosma glandulosa Thunb. Diss. Diosm. 5 (1797)!*; *ej. Prodr. 187 (1800); Pers. Syn. Pl. i, 247 (1805); Roem. and Schultes, Syst. Veg. v, 460 (1819); Thunb. Fl. Cap. ed. Schultes 229 (1823); Bartl. and Wendl. Diosm. 204 (1824). Hartogia glandulosa O. Kze. Rev. Gen. i, 101 (1891).*

Branchlets pubescent, with occasional glandular hairs. Leaves 4—7 mm. long, alternate, erect-spreading, ovate or oblong-elliptic, acute or almost so, rounded or slightly cordate at the base, concave above up the middle, convex towards the slightly recurved margin, with a prominent nerve and small scattered glands beneath, often with glandular hairs on the margin. Flowers in terminal clusters. Peduncles about 7 mm. long, pubescent, with many glandular hairs, ebracteolate. Sepals 2.5 mm. long, ovate-lanceolate, subacute, keeled and pubescent beneath, with occasional glandular hairs on the margin. Petals 5—6.5 mm. long, blade oblong-elliptic or ovate and subcordate at the base, obtuse; claw $\frac{2}{3}$ as long, narrowly linear, ciliate on the lower half. Stamens glabrous.

Staminodes 4.5—5 mm. long, lanceolate, long-acuminate, gland-tipped, subquadrate at the base, concave above in the lower half, ciliate. Ovary puberulous on the upper half, with 3 carpels bearing oblong pilose processes. Style pilose except towards the apex.

South Africa: without precise locality, *Thunberg* (cotype in Stockholm).—MALMESBURY DIV.: near Malmesbury, *Leighton* 56, *Stokoe* 8289, *Levy's* 9184, *Barker* 2553; between Darling and Yzerfontein, *Salter* 6232; Mamre, *Bolus* 4259; between Klipheuwel and Malmesbury, *Pillans* 6933.

Flowering Sept., Oct.

53. **A. anomala** *E. Mey. ex Sond. in Harv. and Sond. Fl. Cap.* i, 408 (1860)!; *Dümmer in Fed. Rep.* xi, 327 (1912). **Hartogia anomala** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets pubescent. Leaves 0.3—1.2 cm. long, alternate, subimbricate, oblanceolate- or elliptic-oblong, elliptic, ovate or ovate-lanceolate, obtuse or subacute, cuneate at the base, concave above, rounded-convex beneath, often slightly keeled near the apex and at first ciliate at the base, with scattered glands beneath. Flowers in terminal clusters. Peduncles about 4 mm. long, \pm pubescent, with conspicuous linear or oblong ciliate bracteoles on the lower half. Sepals 2.75 mm. long, oblong-lanceolate, obtuse, concave and pubescent above, ciliate, slightly keeled near the apex, glabrous beneath. Petals 5 mm. long; blade widely oblanceolate or elliptic-oblong, obtuse, ciliate, sparsely pilose beneath or glabrous, with an apical gland; 1—1½ as long, linear, ciliate. Stamens with pilose filaments. Staminodes 5 mm. long, oblanceolate in the upper half, gland-tipped, with a slightly longer pilose-ciliate claw. Disk well developed, crenulate. Ovary with 3 carpels, glabrous, or with a few hairs on the apex and on the oblong processes. Style pilose except towards the apex.

CALEDON DIV.: near Somerset Sneeuwkop, *Stokoe* 8300, 8490, *Esterhuysen* 1425; Kogelberg, *Stokoe* 892, 1427, in *Bolus Herb.* 17611, *Esterhuysen* 9989; Victoria Peak, *Esterhuysen* 9790; Emerald Dome, *Esterhuysen* 10078.—PAARL DIV.: Winterberg, *Esterhuysen* 9633; Wemmershoek Mts., *Esterhuysen* 4036, 11247, *Bond* 735; Pic Blanc, *Esterhuysen* 8534; Haalhoek Spitzkop, *Esterhuysen* 13527; Du Toit's Kloof, *Drège* (cotype in Riks. Mus., Stockholm).—STELLENBOSCH DIV.: Buller's Kop, *Esterhuysen* 1468; Helderberg, *Esterhuysen* 7665.—WORCESTER DIV.: Brandwacht Peak, *Esterhuysen* 8587; Slanghoek Mts., Witteberg, *Esterhuysen* 8672; Cossacks, *Esterhuysen* 8627; Slanghoek Pile, *Esterhuysen* 1727; Waaihoek Mts., *Esterhuysen* 8327; Milner Peak, *Esterhuysen* 14869.

Flowering Oct.—April. There is a close affinity with *A. bifida* *B. and W.*

54. **A. Dregeana** Sond. in *Harv. and Sond. Fl. Cap.* i, 410 (1860)! **Hartogia Dregeana** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets glabrous. Leaves usually 4—5 mm. long, alternate, ascending, linear, sometimes widening slightly in the upper half, sub-acute, tapering at the base, concave above, glabrous or at first pilose-ciliate, rounded and with many glands beneath. Flowers in terminal clusters. Peduncles 1·5—2 mm. long, glabrous, with oblong ciliate bracteoles at the middle. Sepals 2 mm. long, ovate-lanceolate or oblong-elliptic, obtuse, widely membranous at the margin, ciliate. Petals 3—3·5 mm. long, lanceolate or ovate-lanceolate, tapering into a short narrowly cuneate claw, glabrous. Stamens glabrous. Staminoles 3·5 mm. long, linear-lanceolate, obtuse, tapering into a linear lower part, ciliate on the lower half. Ovary glabrous, with 2 carpels bearing cuneate obtusely pointed and slightly incurved processes. Style glabrous.

VAN RHYNSDORP Div.: Giftberg, *Drège* 7104 (type, in Stockholm, cotypes in Kew Herb., Lund and S. Afr. Mus. Herb.), *Phillips* in *Sladen Mem. Exped.* 7532.

Flowering Sept.—Nov.

55. **A. bifida** Bartl. and Wendl. *Diosm.* 152 (1824); *Walgate in Fl. Cape Peninsula* 540 (1950). **Diosma bifida** Jacq. *Collect.* iii, 278, t. 20, f. 1 (1789); *Willd. Sp. Pl.* i, 1136 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Roem. and Schultes, Syst. Veg.* v, 461 (1819); *Spreng. Syst. Veg.* i, 786 (1825). **D. umbellata** Thunb. in *Hoffm. Phytogr. Blätter* i, 24 (1803); *Roem. and Schultes* op. cit. 458; *Thunb. Fl. Cap. ed. Schultes* 224 (1823). **Dichosma bifida** DC. ex Loudon, *Hort Brit.* 85 (1830). **Agathosma montana** Schldl. in *Linnaea* vi, 207 (1831)!; *Sond. in Harv. and Sond. Fl. Cap.* 410 (1860). **A. desciscens** Fisch. in *Overgr. Bijdr. Naturk. Wetensch.* vii, 22, t. 2 (1832). **A. lediformis** Eckl. and Zeyher, *Enum.* 109 (1835)!; *Bartl. in Linnaea* xvii, 372 (1843); *Sond. op. cit.* 408. **A. serruriaefolia** Eckl. and Zeyher l. c.! **A. nigromontana** Eckl. and Zeyher, *Enum.* 111!; *Sond. op. cit.* 410. **A. monticola** Sond. *op. cit.* 409! **A. umbellata** Sond. *op. cit.* 408; *Engler in Engl. and Prantl, Pflanzenfam.* iii, §4, p. 150 (1896); *Dümmer in Fed. Rep.* xi, 326 (1912). **A. gracilicaulis** Sond. *op. cit.* 409! **Hartogia gracilicaulis**, **H. lediformis**, **H. montana**, **H. nigromontana**, **H. umbellata** O. Kze. *Rev. Gen.* i, 101 (1891). **Agathosma taxifolia** Schltr. in *Engl. Bot. Jahrb.* xxvii, 161 (1900)!; *Dümmer op. cit.* 328. **A. stricta** W. Dod in *Journ. Bot.* xxix, 398 (1901); *Dümmer op. cit.* 327; *Walgate in Fl. Cape Peninsula* 540. **A. Bolusii** Dümmer *op. cit.* 331!. **A. capituliformis** var. **caledonensis** Dümmer l. c.! **A. gracillima** Dümmer *op. cit.* 328!. **A. struthioloides** Dümmer *op. cit.* 326!. **A. uncinata** Dümmer *op. cit.* 414!.

Branchlets glabrous, puberulous, pubescent or pilose (usually in

strips alternating with the leaf-bases). Leaves 0·5—1·3 cm. long, alternate, erect-spreading or ascending, often subimbricate, ovate-lanceolate, lanceolate, linear-lanceolate, lanceolate-linear or linear, rarely slightly widened in the upper half, acute, subacute or obtuse, rounded or cuneate at the base, concave above, \pm keeled or rounded beneath, often swollen behind the apex, glabrous or \pm pilose-ciliate, rarely pilose beneath. Flowers in terminal clusters. Peduncles 2—8 mm. long, glabrous, sometimes purplish, with bracteoles on the lower half. Sepals 1·5—3 mm. long, ovate- or oblong-lanceolate, ovate-oblong or ovate, obtuse, acute or acuminate, obtusely keeled, usually with conspicuous glands beneath, glabrous or ciliate, sometimes pubescent above, often hyaline at the margin. Petals 3·5—5·5 mm. long; blade oblanceolate, obovate or obovate-elliptic, very obtuse, often retuse, rarely pilose above and on the margin, with a conspicuous gland behind the apex; claw half to nearly twice as long, narrowly linear, glabrous, or ciliate on the lower half. Stamens glabrous. Staminodes resembling the petals but usually slightly shorter, villous on the lower half. Ovary glabrous, or pilose on the apex, with 3 or, very rarely, 4 carpels bearing oblong or obovate glabrous or \pm pilose processes. Style glabrous or \pm pilose.

BREDASDORP DIV.: Bredasdorp, *Muir* 5013; Agulhas, *Esterhuysen* 7629; Elim, *Bolus* 6780; 9 miles west of Elim, *Salter* 4855; between Elim and "Fairfield," *Bolus* 8529; Elandsberg, *Gillett* 4342; Napier, *Schlechter* 9653 (cotypes of *A. taxifolia* in Kew Herb. and Stockholm); coastal hills between Klein River and Agulhas, *Ecklon and Zeyher* 855.—CALEDON DIV.: hills near Caledon, *Zeyher* 2170 (cotypes of *A. monticola* in S. Afr. Mus. Herb. and Stockholm); Babylons Tower and Hottentots Holland Mts., *Zeyher* 157, 2172; Sir Lowry's Pass, *Barker* 1151, *Bolus* 4116, *Schlechter* 7227, *Stokoe* 8267; Viljoen's Pass, *Hafstrom and Acocks* 787; Houwhoek, *Bolus* 9869, *Galpin* 3874, *Levyns* 3465, *Schlechter* 5509; Palmiet River Mts., *Stokoe* 966; Platteberg, *Stokoe* 9153; Stettynsberg, *Esterhuysen* 11107; River Zonder Einde Peak, *Acocks* 1963, *Stokoe* 9360, *Thorne* in S. Afr. Mus. 45836; Nieuweberg, *Stokoe* 4036, 8307; Kogelberg, *Compton* 16451, *Esterhuysen* 9987, 13334, 13348; Paardeberg Forest Reserve, *Levyns* 8763; Kleinmond, *Esterhuysen* 7626; Hanglip, *Compton* 6105, 13590; Hermanus, *Barker* 1863, *L. Guthrie* in *Bolus* Herb. 17015, *Bodkin* in *Guthrie* Herb. 4230, *Bolus* 9857 (type of *A. Bolusii* in Kew Herb., cotypes in *Bolus* Herb. and *Natal* Herb.); Genadendal, *Ecklon and Zeyher* 866 (cotypes of *A. montana* in Kew Herb., S. Afr. Mus. Herb. and Stockholm); mountains west of Viljoen's Pass, *Stokoe* 8541; Landdrost Kop, *Esterhuysen* 1426; Onrust River, summit of mountain, *Esterhuysen* 4243; Elgin, *Compton* 16516, *Leighton* 815, *Stokoe* 8268; mountains south of Sir Lowry's Pass, *Stokoe* in *Bolus* Herb. 17878; between Villiers-

dorp and French Hoek, *Bolus* 5141; Kleinmond, *Compton* 12373, 12811, *Esterhuysen* 7626; near Appel's Kraal, *Zeyher* 2167 (type of *A. gracili-caulis* in Stockholm, cotype in S. Afr. Mus. Herb.); Steenbras, *Thorne* in S. Afr. Mus. Herb. 50412; between Caledon and Genadendal, *Ecklon and Zeyher* 856 (cotypes of *A. serruriaefolia* in S. Afr. Mus. Herb. and Stockholm); hills north-east of the top of French Hoek Pass, *Esterhuysen* 1183; Louw's Hoek Peak, *Stokoe* 9344; near Houwhoek, *Bolus* 9869 (type of *A. capituliformis* var. *caledonensis* in Bolus Herb.); Houwhoek and Zwartberg, *Ecklon and Zeyher* 867 (cotypes of *A. nigromontana* in S. Afr. Mus. Herb. and Stockholm); Palmiet River Mouth, *Levy's* 7758; near Caledon, *Bolus* 8504; base of Buffels Mt., *Pillans* 8300; Zwartberg, *Guthrie* 2481; "Highlands," *Compton* 12281, 14086; "Aries Kraal," *Compton* 16853; Nieuweberg, *Compton* 6742.—CAPE DIV.: Constantiaberg, *Compton* 12535, 14161, 14165, *Esterhuysen* 3834; between Constantiaberg and Steenberg, *Pillans* 8985; Steenberg, *Compton* 16437; Noordhoek Mt., *Barker* 2084; marsh at head of Elsje's Stream, *Salter* 5700; Kabonkelberg, *Salter* 246/19a; Zwartkop Range, *Walgate* 5; Muizenberg Mt., *Barker* 4215; Klaver Vlei, *Salter* 6424; marsh west of Paul's Berg, *Salter* 7089.—CLANWILLIAM DIV.: between Bergvlei and Langvlei, "Zwartbast Kraal," *Drège*; near "Brakfontein," *Ecklon and Zeyher* 854 (cotypes of *A. lediformis* in Albany Mus., Kew Herb., S. Afr. Mus. Herb. and Stockholm); valley south-east of Uitkyk Pass, *Acoc's* 5662; Sneeuwberg, Duivelsgat, *Esterhuysen* 13110; Cederberg, *Thode* A 1973.—LADISMITH DIV.: Roodeberg, *Esterhuysen* 17175.—MALMESBURY DIV.: flats near Mamre, *Niven* 22.—PAARL DIV.: Drakenstein Mts. at French Hoek Pass, *Compton* 6008, *Galpin* 12400; Lower Wellington Sneeuwkop, *Esterhuysen* 12431; Upper Wellington Sneeuwkop, *Esterhuysen* 15024.—RIVERSDALE DIV.: lower slopes of the Langeberg at Garcia's Pass, *Burchell* 6934 (type of *A. struthioloides* in Kew Herb.), 7009, *Bolus* 11242; Witte Els, *Muir* 1267.—STELLENBOSCH DIV.: Helderberg, *Esterhuysen* 14627, *Parker* 3874, *Stokoe* 8269, in Bolus Herb. 17647, 17880; above "Lourensford," *Esterhuysen* 14128; Somerset West, *Parker* 3712; Pic Sans Nom, *Esterhuysen* 12521.—SWELLENDAM DIV.: Potteberg, hills north of "Elandspot," *Pillans* 9408.—TULBAGH DIV.: summit of Vogel Vlei Mts., *Andreae* 634.—WORCESTER DIV.: Witteberg, *Esterhuysen* 9470, *Wasserfall* 641; Bain's Kloof, *Schlechter* 9092; Du Toit's Peak, *Marloth* 2502; Milner Peak, *Esterhuysen* 14251; Mostert's Hoek Twins, *Esterhuysen* 9835; Buffels Hoek Peak, *Esterhuysen* 8404; Wilde Paardeberg, *Stokoe* in Bolus Herb. 17870.

Flowering Jan.—Dec. This is one of the most variable and taxonomically difficult species. The scope of the species is now considerably widened so as to include the many diverse forms. The chief variations

are in the length and width of the leaves and the shape of the lower surface which may be conspicuously keeled or rounded. The sepals, also, vary considerably in shape. The typical form seems to be the one which is frequent on damp flats in the Caledon Division. The forms with hairs on the leaves and floral parts occur at higher altitudes with different climatic conditions. Several forms appear distinct enough for specific rank, but they are connected through many other forms.

56. **A. stenopetala** Steud. *Nom. ed.* 2, i, 36 (1840). **Diosma stenopetala** Steud. in *Flora* 1830, p. 549. **Agathosma filipetala** Eckl. and Zeyher, *Enum.* 112 (1835)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 411 (1860). **Hartogia stenopetala** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets puberulous or pubescent. Leaves usually 0·8—1·3 cm. long, alternate, crowded, erect-spreading, linear or lanceolate-linear, obtuse, rounded at the base, slightly convex, flat or slightly concave above, with a slightly raised nerve and scattered glands beneath, glabrous, or sometimes pilose at the margin and beneath on the nerve. Flowers in terminal clusters. Peduncles 3—5 mm. long, pubescent, with minute bracteoles at or shortly below the middle. Sepals 2—3 mm. long, linear-lanceolate, obtuse or almost so, concave above, glabrous or ciliate, obtusely keeled. Petals 4·5—5·5 mm. long; blade oblanceolate-linear, obtuse; claw as long or slightly longer, very slender, pilose throughout or only on the lower half. Stamens with filaments pilose on the lower half. Staminodes 4—5·5 mm. long, with a linear blade and slightly longer pilose claw. Ovary glabrous, with 2 carpels bearing oblong obtuse processes. Style glabrous.

HUMANSDORP DIV.: hills near Humansdorp, *Kennedy* in MacOwan Herb. 898, in *S. Afr. Mus. Herb.* 30655.—PORT ELIZABETH DIV.: Port Elizabeth, *Salter* 372/31, *Kemsley* 74, *Fries*, *Norlinde* and *Weimarck* 157; sand dunes near Port Elizabeth, *Marloth* 12605; Humewood, *Paterson* 784; near Schoenmakers Kop, in sand, *L. Bolus* in *Bolus Herb.* 23972.—UITENHAGE DIV.: between Coega and Sundays rivers, "Grassrug," calcareous hills, *Ecklon* and *Zeyher* 881 (type of *A. filipetala* in Stockholm, cotype in *S. Afr. Mus. Herb.*).

Flowering June—Nov.

57. **A. linifolia** Licht. ex Bartl. and Wendl. *Diosm.* 187 (1824)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 411 (1860). **Bucco linifolia** Roem. and Schultes, *Syst. Veg.* v, 448 (1819). **Hartogia linifolia** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets sparsely pubescent on strips alternating with the leaf-bases. Leaves 1—2 cm. long, alternate, erect-spreading, linear or linear-

lanceolate, acute, rounded or shortly cuneate at the base, flat or slightly convex above, often slightly recurved and sparsely pilose at the margin, with a prominent nerve and impressed scattered glands beneath. Flowers in terminal clusters. Peduncles 3—4 mm. long, glabrous, with bracteoles at the middle or on the lower half. Sepals 1.75 mm. long, lanceolate, subacute, keeled, glabrous. Petals 4 mm. long; blade obovate or oblong-elliptic, obtuse; claw $\frac{2}{3}$ as long, narrowly linear, very sparsely ciliate. Stamens with sparsely ciliate filaments. Staminodes 3.5 mm. long, oblanceolate- or obovate-oblong in the upper half, obtuse, gland-tipped, linear and ciliate in the lower half. Ovary with 2 carpels bearing linear-oblong acute processes pilose on the apex. Style glabrous.

SWELLENDAM DIV.: Swellendam, *Fry* in Galpin Herb. 4990; Duyvelsbosch, *Lichtenstein* (cotype in Stockholm); above Voormansbosch and Duyvelsbosch, *Beil* in Ecklon and Zeyher Herb. 877.

Flowering July, Aug.

58. **A. virgata** Bartl. and Wendl. *Diosm.* 139 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 412 (1860); *Dümmer in Fed. Rep.* xi, 330 (1912). **Diosma virgata** Lam. *Encycl. Meth.* ii, 286 (1786); *Thunb. Prodr.* 84 (1794); *ej. Diss. Diosm.* 4, 8 (1797); *Willd. Sp. Pl.* i, 1134 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Roem. and Schultes, Syst. Veg.* 455 (1819); *Thunb. Fl. Cap. ed. Schultes* 22 (1823); *DC. Prodr.* i, 717 (1824). **Bucco Lamareckiana** Roem. and Schultes, *Syst. Veg.* v, 447 (1819). **Diosma parviflora** Willd. ex Roem. and Schultes *op. cit.* 462. **Agathosma parviflora** Bartl. and Wendl. *Diosm.* 181; *Sond. op. cit.* 409 incl. var. **glabrata**. **A. patentissima** Eckl. and Zeyher, *Enum.* 114 (1835)! **A. aulonophila**, **A. berzeliaefolia** Eckl. and Zeyher, *Enum.* 115! **A. commutata** *Sond. op. cit.* 412!; *Dümmer l.c.* incl. vars. **A. cuspidata** var. **glabra** *Sond. op. cit.* 432! **Hartogia aulonophylla**, **H. parviflora** O. Kze. *Rev. Gen.* i, 101 (1891).

A usually laxly branched shrub about 1 m. high. Branchlets glabrous, or sometimes pubescent on strips alternating with the leaf-bases. Leaves 3—8 mm. long, alternate, ascending, often subimbricate, linear or lanceolate-linear, acute, acuminate, subacute or obtuse, tapering shortly or rounded at the base, concave above, \pm keeled beneath on the upper half, glabrous, or sometimes ciliate on the lower half. Flowers in terminal clusters, or the lower axillary. Peduncles usually 5—6 mm. long, glabrous or sometimes pubescent, often purplish, with slender, sometimes vestigial, bracteoles on the lower half. Sepals 0.75—1.5 mm. long, lanceolate or ovate-lanceolate, acute or obtuse, concave above, obtusely keeled, glabrous. Petals 4—6 mm. long; blade elliptic-oblong or oblanceolate, obtuse; claw half as long or slightly longer, narrowly linear or subfiliform, \pm pilose-ciliate on the lower half. Stamens glabrous or

sparsely pubescent on the filaments. Staminodes 4—5.75 mm. long, petaloid, oblong, linear or oblanceolate in the upper half, obtuse or rarely acute, narrowly linear or subfiliform and villous in the lower half, with a conspicuous gland behind the apex. Disk crenulate. Ovary glabrous, with 2 or, very rarely, 3 carpels bearing oblong or obovate processes. Style glabrous or very sparsely pubescent on the lower half.

CALEDON DIV.: mountains at Genadendal, *Burchell* 7600, *Gillett* 888, *Schlechter* 10287; Stettynsberg, *Esterhuysen* 11133, 15623; hills near the mouth of the Klein River, *Ecklon and Zeyher* 904.—CERES DIV.: near Ceres, *Bolus* 8370, 8395, *Hutchinson* 605, *Levyns* 1074, 4677; Castle Rocks, *Esterhuysen* 14151, 14159; Michell's Pass, *Esterhuysen* 6201, *Compton* 6717, 20157, *Schlechter* 8938, *Walgate* 243, 359; Gydouw Pass, *Esterhuysen* 3956, *Leipoldt* 3843, *Isaac* in *Bolus* Herb. 2395; 7 miles west of Gydouw Pass, *Hutchinson* 1051; Witzenberg Vlake, *Compton* 13011, 21019; De Keur, *Compton* 6513.—CLANWILLIAM DIV.: east slopes of Grasruggens Mt., *Pillans* 8718; "The Baths," *Compton* 5382.—MALMESBURY DIV.: between Bokbaai and Darling, *Esterhuysen* 3831.—MONTAGU DIV.: Rabiesberg, *Compton* 5791.—PAARL DIV.: French Hoek Pass, *Acocks* 3839; French Hoek Forest Reserve, *Compton* 13838, *Pillans* 9516, *Leighton* in *Bolus* Herb. 23950; Wemmershoek Mts., *Esterhuysen* 9117, *Wasserfall* 547; Groot Drakenstein Mts., *Esterhuysen* 14053; Bailey's Peak, *Esterhuysen* 8519a; French Hoek, *Phillips* 1082.—PIKETBERG DIV.: mountains above Porterville, *Esterhuysen* 16144, 16093, 17296, *Stokoe* 8271, *Schlechter* 10719, *Edwards* in *Bolus* Herb. 24437; "The Rest," *Compton* 4321, *Gillett* 3736.—SWELLENDAM DIV.: mountains near Swellendam, *Mund* in *Ecklon and Zeyher* Herb. 896 (cotype of *A. parviflora* var. *glabrata* in *S. Afr. Mus. Herb.*).—TULBAGH DIV.: near Tulbagh Waterfall, *Ecklon and Zeyher* 900 (cotype of *A. patentissima* in *S. Afr. Mus. Herb.*), 903 (cotypes of *A. aulonophila* in *S. Afr. Mus. Herb.* and *Stockholm*), *Bolus* 5142; near the Winterhoek, *Ecklon and Zeyher* 906 (cotypes of *A. berzeliaefolia* in *S. Afr. Mus. Herb.* and *Stockholm*); Vogel Vlei Mts., *Andrae* 652.—WORCESTER DIV.: Bain's Kloof, *Barker* 4243, *Compton* 16241, 17504, 18629, *Salter* 4775, *Schlechter* 9092; Du Toit's Kloof, *Esterhuysen* 16068, *Levyns* 8613; Molenaarsberg, *Compton* 20141, *Esterhuysen* 14067; Waaihoek Mt., *Esterhuysen* 8290, 14839, *Wasserfall* 818; Chavonnesberg, *Esterhuysen* 8193, 14586; Wabooms River, *Esterhuysen* 8958; Malkops Kloof, *Esterhuysen* 3136; Fonteintjiesberg, *Esterhuysen* 10950; Matroosberg, above Groothoek Kloof, *Esterhuysen* 14184, 14225; below Milner Peak, *Esterhuysen* 14249; Orchard Mt., *Esterhuysen* 10347; Hex River Mts., Els Kloof, *W. Dod* 4033; near De Doorns, *Bolus* 13083; Sebastian Kloof, *Compton* 11734; east slopes of Prospect Peak, *Esterhuysen* 15904; Waaihoek Peak, *Esterhuysen* 15120.

Flowering April—Dec. This species may be an advanced form of *A. bifida* with mostly narrower leaves and with a reduced ovary. The leaves are sometimes indistinguishable from those of the narrow-leaved forms of *A. bifida*.

59. *A. tulbaghensis* Dümmer in *Ann. Bolus. Herb.* iii, 48 (1920)!

A much branched shrub 0·75—1 m. high, with branchlets sparsely pilose on strips alternating with the leaf-bases. Leaves 0·6—1 cm. long, alternate, ascending or erect-spreading, slightly incurved, linear sometimes widening slightly in the lower or upper half, obtuse or subacute, tapering into a wide petiole, deeply concave above, involute at the margin, pilose-ciliate, rounded and with many prominent glands beneath. Flowers in terminal clusters. Peduncles about 5 mm. long, glabrous, with ciliate bracteoles on the lower half. Sepals 2 mm. long, ovate-lanceolate, obtuse, ciliate or glabrous, rounded and with conspicuous glands beneath. Petals 3 mm. long; blade elliptic-oblong, obtuse; claw about half as long, narrowly linear, sparsely ciliate. Stamens glabrous. Staminodes 3 mm. long, petaloid; blade linear-oblong, emarginate, with a gland in the sinus; claw half as long, linear, ciliate. Ovary glabrous, with 2 or very rarely 3 carpels bearing subclavate processes. Style glabrous.

TULBAGH DIV.: Little Winterhoek, *Marloth* 493 (type, in S. Afr. National Herb., cotype in Bolus Herb.); Great Winterhoek, near the summit, *Phillips* 1718.

Flowering Nov.—Jan. The affinity seems to be with *A. bifida* rather than with any of the other bicarpellate species.

60. *A. Esterhuyseniae* sp. nov.; ramulis puberulis et pilosis; foliis alternatis linearibus obtusis, supra concavis glabris, margine arte involutis, subtus tuberculatis hispidis; floribus terminalibus; pedunculis hispidulis bracteolatis; sepalis oblanceolato-oblongis obtusis pubescentibus ciliatis, margine hyalino; petalis anguste obovatis, infra medium unguicularibus; staminibus glabris; staminodis oblanceolatis, infra medium pilosis anguste unguicularibus; ovario 2- vel 3- loculari puberulis vel pubescentibus cornubus rotundatis minutis, stylo sparse pubescente.

Shrub about 40 cm. high, with slender puberulous and sparsely pilose branchlets. Leaves 4—6 mm. long, alternate, erect-spreading, slightly incurved, linear, obtuse, rounded at the base, concave and glabrous above, with closely involute margins, rounded, tubercled and hispid beneath, with prominent glands. Flowers in terminal clusters. Peduncles 0·75—1 mm. long, hispidulous, with linear pilose bracteoles near the apex, subtended by linear pilose-ciliate bracts. Sepals 1·5—2 mm. long,

oblanceolate-oblong, obtuse, pubescent above, hyaline at the margin, pilose-ciliate, rounded and sparsely pubescent beneath, gibbous and with prominent glands behind the apex. Petals 6 mm. long; blade narrowly obovate; claw $1\frac{1}{2}$ times as long, slender, pilose on the lower half. Stamens glabrous. Staminodes 3—3.5 mm. long, with an oblanceolate blade and slender pilose claw adnate almost half the length to the petals. Disk conspicuous, crenulate. Ovary \pm puberulous or pubescent, with 2 or rarely 3 carpels bearing minute rounded processes. Style sparsely pubescent.

CLANWILLIAM Div.: Cederberg, Uitkyk Peak, summit, *Esterhuysen* 7375; between Heuning Vlei and Crystal Pool, *Esterhuysen* 7533 (type, in Bolus Herb.); Krakadouwsberg, *Esterhuysen* 7508, 14317.

Flowering Dec. The affinity is with *A. krakadouwensis* Dümmer from which it differs chiefly by the leaves being tubercled, the staminodes being partly adnate to the petals, by the carpels being fewer, and by the minute processes on the carpels.

61. *A. pubigera* Sond. in *Harv. and Sond. Fl. Cap.* i, 414 (1860)! *Hartogia pubigera* O. Kze. *Rev. Gen.* i, 101 (1891). *Agathosma decipiens* Dümmer in *Fed. Rep.* xi, 416 (1912)!

A low much branched shrub with puberulous branchlets. Leaves 5—8 mm. long, alternate, erect-spreading, often slightly recurved, oblong, elliptic-oblong, oblanceolate or oblong-oblanceolate, acute, subacute or obtuse, rounded or shortly tapered at the base, entirely puberulous, concave above, obtusely keeled and with conspicuous glands beneath. Flowers in terminal clusters. Peduncles 2.5—6 mm. long, puberulous, with bracteoles on the lower half. Sepals 1—1.5 mm. long, oblong, ovate-lanceolate or ovate, obtuse or subacute, convex and puberulous beneath. Petals 4—5.5 mm. long, glabrous; blade elliptic or obovate, very obtuse; claw about $1\frac{1}{2}$ times as long, narrowly linear. Stamens glabrous. Staminodes 3 mm. long, lanceolate-linear, slightly concave above, pubescent above and beneath. Disk with deltoid teeth at the margin. Ovary puberulous, with one carpel without a process. Style sparsely pubescent on the lower half. Fruit elliptic, tubercled and hispid, with a clavate hispid process.

CLANWILLIAM Div.: Ezelsbank, *Drège* 7120 (type of *A. pubigera* in Stockholm, cotype in Kew Herb.); Koudeberg, *Schlechter* 8760 (type of *A. decipiens* in Kew Herb., cotypes in Albany Mus., Bolus Herb., S.A. National Herb. and Stockholm); Kromme River, *Acocks* 3124, *Leighton* in Bolus Herb. 21588; Heuning Vlei, *Esterhuysen* 3132, 8058; between Heuning Vlei and Koupoort, *Esterhuysen* in Bolus Herb. 23980; between Pakhuis and Heuning Vlei, *Esterhuysen* 7459; Boontjieskraal, *Esterhuysen* 8062; Tafelberg Area, *Esterhuysen* 14323.

Flowering Aug., Sept. The most distinctive character is the toothing of the disk.

62. **A. Stokoei** sp. nov.; ramulis pilosis; foliis alternatis linearibus obtusis, supra concavis glabris vel pilosis saepe margine pilosis, subtus obtuse convexis; floribus terminalibus; pedunculis pilosis bracteolatis; sepalis ovatis obtusis margine hyalinis, subtus convexis pilosis; petalis glabris, supra medium obovatis, infra medium linearibus; staminibus glabris; staminodis linearibus glabris, basi versus attenuatis, apice glandula rotundata notatis; ovario 2-loculari, apice piloso cornubus late oblongis; stylo glabro.

A very much branched shrub usually about 30 cm. high, with slender pilose branchlets. Leaves 4—8 mm. long, alternate, erect-spreading, linear, obtuse, rounded at the base, concave and glabrous or pilose above, rounded and with scattered glands beneath, often pilose at the margin. Flowers in terminal clusters. Peduncles 3·5 mm. long, pilose, with slender pilose bracteoles on the upper half. Sepals 1·5 mm. long, ovate, obtuse, hyaline at the margin, rounded and pilose beneath. Petals 3·5 mm. long, glabrous; blade obovate, very obtuse; claw half as long, linear. Stamens glabrous. Staminodes 2·5 mm. long, linear, tapering to a slender base, glabrous, tipped with a round gland. Ovary pilose on the apex, with 2 carpels bearing widely oblong processes pilose on the apex. Style glabrous.

CALEDON DIV.: Hottentots Holland Mts., *Stokoe* 868, 8287 (type, in Bolus Herb.), 8288.

Flowering Nov. The affinity is with *A. bifida* from which it is distinguished by distinctly hyaline margins of the sepals, and by a bicarpellate ovary.

63. **A. aemula** Schltr. in *Engl. Bot. Jahrb.* xxvii, 160 (1899)!

Branchlets glabrous or rarely villous. Leaves usually 4—6 mm. long, alternate, ascending, linear, subacute, tapering at the base, concave above, glabrous or sometimes villous, rounded-convex and with many glands beneath. Flowers in terminal clusters. Peduncles 0·5—1·5 mm. long, glabrous or puberulous, with slender puberulous bracteoles at or near the apex. Sepals 1·5—2·5 mm. long, ovate- or oblong-lanceolate, or oblong-linear, obtuse, membranous at the margin, ciliate, sometimes sparsely pilose above, widely convex and with 2 rows of glands beneath. Petals 4—6 mm. long, spatulate, very obtuse, often retuse, glabrous or sparsely pilose on the very slender basal part. Stamens glabrous. Staminodes 2·5—3·5 mm. long, linear-spatulate, pilose on the lower half. Ovary glabrous, or pilose on the upper half, with 3 carpels bearing oblong- or linear-clavate processes. Style pilose except towards the apex.

CLANWILLIAM DIV.: Pakhuis, *Barker* 4712, *Compton* 9357, 20927, 20934, *Esterhuysen* 3134, *Leipoldt* in *Bolus Herb.* 23948, *Schlechter* 8609 (cotypes in Albany Mus., *Bolus Herb.*); between Pakhuis and Heuning Vlei, *Esterhuysen* 7433; between Heuning Vlei and Boontjes Kloof, *Esterhuysen* 7518; Northern Cederberg, Koupoort, *Esterhuysen* 12133.

Flowering Sept.—Dec.

64. **A. scaberula** *Dümmer in Ann. Bolus Herb.* iii, 47 (1920)!

A rigid shrub about 20 cm. high, with hispid branchlets. Leaves 3—5 mm. long, alternate, ascending, subimbricate, ovate, acute, rounded or subcordate at the base, slightly convex and smooth above, incurved above the middle, with acute papillae on the margin, nerve-keeled and rough with papillae beneath, gibbous behind the apex. Flowers in terminal clusters. Peduncles 0.5—1 mm. long, strigillose, with linear basal bracteoles pilose beneath on the nerve and margin. Sepals 2.5 mm. long, linear-oblong, subacute, trinerved, incurved at the apex, ciliate, pilose beneath on the upper half. Petals 5.5 mm. long; blade oblanceolate-oblong, obtuse; claw twice as long, slender, ciliate. Stamens sparsely strigillose on the filaments. Staminodes 4.5 mm. long, adhering to the petals at the base, composed of an oblanceolate blade and a slender ciliate claw 3 times as long. Ovary with 3 carpels bearing elliptic, sometimes pilose, processes. Style glabrous.

RIVERSDALE DIV.: near Albertinia, Bovenplaats, *Muir* 1255 (type, in *Bolus Herb.*, cotypes in Albany Mus. and S. Afr. National Herb.).

Flowering Nov. The affinity is obviously with *A. eriantha*, and it is certainly close.

65. **A. robusta** *Eckl. and Zeyher, Enum.* 110 (1835)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 430 (1860). **Hartogia robusta** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets pubescent. Leaves 5—7 mm. long, alternate, erect, subimbricate, linear-lanceolate, acute, navicular, rounded at the base, slightly incurved, \pm gibbous behind the apex, glabrous above, rather acutely keeled, pilose on the keel and margin, with scattered glands beneath. Flowers in terminal clusters. Peduncles 8 mm. long, villous, with slender bracteoles near the base. Sepals 2.5 mm. long, lanceolate-ovate, subacute, sometimes slightly incurved and gibbous behind the apex, concave and pubescent above, obtusely keeled and villous beneath. Petals 5.5 mm. long, glabrous; blade subrotund; claw almost $1\frac{1}{2}$ times as long, linear. Stamens glabrous. Staminodes 3.25 mm. long, oblanceolate-oblong, obtuse, with a gland behind the apex, tapering to a slender base, villous above on the lower half. Ovary sparsely pilose on the apex, with 2 carpels bearing oblong obtuse processes. Style glabrous.

SWELLENDAM DIV.: hills near Swellendam, *Mund* in Ecklon and Zeyher Herb. 863 (cotypes in S. Afr. Mus. Herb. and Stockholm).

Flowering Oct. All the specimens seen were gathered from cropped, dwarf plants.

66. *A. eriantha* Steud. *Nom.* ed. 2, i, 35 (1841). *Diosma eriantha* Steud. in *Flora* 1830. p. 550. *Agathosma serpyllacea* var. *latifolia* Schldl. in *Linnaea* vi, 205 (1831)! *A. Schlechtendahlia* Eckl. and Zeyher, *Enum.* 109 (1835)! absque descr. *A. Schlechtendalii* Sond. in *Harv. and Sond. Fl. Cap.* 407 (1860)! *Hartogia eriantha* O. Kze. *Rev. Gen.* i, 101 (1891). *Agathosma viscida* Dümmer in *Fed. Rep.* xi, 324 (1912)!

Branchlets rigid, glabrous except for coarse hairs at the base of the leaves. Leaves 5—7 mm. long, alternate, erect-spreading, crowded, slightly incurved in the upper half, lanceolate-ovate, ovate-lanceolate or elliptic-oblong, acute, rounded at the base, concave and glabrous above, with long coarse and rigid hairs on the margin, stoutly keeled, gibbous behind the apex, with rigid coarse hairs on the keel, with small scattered glands beneath. Flowers in terminal clusters. Peduncles 1.5—2 mm. long, sparsely hispid, with conspicuous bracteoles on the lower half. Sepals 2.5—3 mm. long, oblong-lanceolate, acute, ciliate, with an obtuse sparsely pilose keel on the upper half. Petals 6—8 mm. long; blade narrowly ovate, obovate, elliptic or oblong-ovate, obtuse; claw twice as long, filiform, villous. Stamens with villous filaments. Staminodes 5.25—6 mm. long, adnate to the lower half of the petals; blade linear-oblong or narrowly obovate-oblong, obtuse; claw twice as long, filiform, villous. Ovary glabrous, with 3 carpels bearing oblong processes. Style glabrous.

South Africa: without precise locality, *Thorn* 39 (type of *A. viscida* in Kew Herb.).—BREDASDORP DIV.: Kliprug, *Henrici* 3715.—SWELLENDAM DIV.: calcareous hills between the Breede and Duyvenhoeks rivers, *Ecklon and Zeyher* 859 (type of *A. Schlechtendalii* in Stockholm, cotype in S. Afr. Mus.).

Flowering Sept.—Nov.

67. *A. serpyllacea* Licht. ex Roem. and Schultes, *Syst. Veg.* v, 447 (1819); Bartl. and Wendl. *Diosm.* 153 (1824); Schldl. in *Linnaea* vi, 204 (1831) incl. vars.; Sond. in *Harv. and Sond. Fl. Cap.* i, 427 (1860) incl. vars.; Dümmer in *Fed. Rep.* xi, 412 (1912) incl. var. *Bartlingiana*; Walgate in *Fl. Cape Peninsula* 542 (1950). *Bucco cuspidata* Wendl. *Collect.* iii, 17, t. 81 (1819). *Diosma stricta* Willd. ex Roem. and Schultes, *Syst. Veg.* v, 462. *D. bruniades* Link, *Enum. Hort. Berol.* i, 237 (1821). *Agathosma cuspidata* Bartl. and Wendl. *Diosm.* 182, t. B. f. vii, 1—8 (1824); Sond. *op. cit.*

432, excl. var. **glabra**; *Dümmer op. cit.* 420. **A. rubra** Willd. and Licht. ex Bartl. and Wendl. *Diosm.* 178; *Sond. op. cit.* 432. **Barosma bruniades Hoffm. Verz. Pfl. Nachtr.** i, 128 (1826). **Agathosma Thunbergiana** Schldl. in *Linnaea* vi, 204 (1831) excl. syn. *Thunb.*, non Bartl. and Wendl. **A. Eckloniana** Schldl. *op. cit.* 207; *Sond. op. cit.* 429. **A. Bartlingiana** Eckl. and Zeyher, *Enum.* 114 (1835)! partim. **A. hyponeura** Eckl. and Zeyher. l.c.! **A. glabra** Eckl. and Zeyher *op. cit.* 116! **A. ambigua** Sond. *op. cit.* 426; *Dümmer in Fed. Rep.* xi, 411, incl. var. **Hartogia ambigua**, **H. cuspidata**, **H. Eckloniana** O. Kze. *Rev. Gen.* i, 101 (1891). **H. rubra**, **H. serpyllacea** O. Kze. *op. cit.* 102. **Agathosma filamentosa** Schltr. in *Engl. Bot. Jahrb.* xxiv, 439 (1898)!; *Dümmer op. cit.* 413. **A. Dodii** *Dümmer loc. cit.*!; *Walgate in Fl. Cape Peninsula* 542. **A. gibbosa** *Dümmer loc. cit.*! **A. brevistrigillosa** *Dümmer op. cit.* 417! **A. hortensis** *Dümmer op. cit.* 420! incl. var. **spontanea**.

A low shrub. Branchlets \pm pubescent or villous, with spreading or ascending hairs, sometimes glabrous. Leaves mostly 0.5–1 cm. long, alternate, erect-spreading or, less often, ascending, linear or lanceolate-linear and acuminate, lanceolate, linear- or oblong-lanceolate and acute, subacute or acuminate, rarely ovate, rounded at the base, often somewhat incurved above the middle, \pm concave above (mostly in the upper half), rarely subcucullate at the apex, with a prominent nerve beneath, gibbous behind the apex, sometimes subtrigonous and slightly keeled (in the narrower forms), often \pm revolute at the margin, entirely glabrous, puberulous, pubescent or pilose, or pilose at the margin and beneath on the nerve, with impressed glands at the margin and on the keel. Flowers in terminal clusters, or the lower axillary. Peduncles usually 3–6 mm. long, \pm pubescent, sparsely pilose or glabrous, with bracteoles at the middle or on the lower half. Sepals usually 1.5–3 mm. long, up to 4 mm. long, lanceolate, linear- or ovate-lanceolate, ovate or deltoid-ovate, acuminate, acute, subacute or obtuse, obtusely keeled \pm ciliate, rarely glabrous or sparsely pubescent beneath. Petals 3.5–5.5 mm. long; blade oblong-elliptic, obovate, widely obovate or subrotund, abruptly or gradually passing into the claw, glabrous, \pm pubescent above or rarely ciliate on the lower half; claw $\frac{1}{2}$ – $1\frac{1}{2}$ times as long, narrowly linear or subfiliform, glabrous or ciliate. Stamens glabrous. Staminodes 1.75–4.5 mm. long, linear, linear- or lanceolate-oblong, attenuate, acute or obtuse, cuneate or subfiliform at the base, ciliate except at the base and apex, or ciliate only on the lower or upper half, with an apical gland. Ovary hispid, pubescent or pilose on the apex, with 3 carpels bearing oblong processes usually pilose on the apex. Style glabrous.

South Africa: without precise locality, *Thorn* 474.—BREDASDORP DRV.: Elim; *Bolus* 19164, *Compton* 9086, *Guthrie* 3753, 3854, *Schlechter*

7678 (cotypes of *A. filamentosa* in Albany Mus. and Bolus Herb.); Bredasdorp, *Compton* 9145, 9181; The Poort, *Barker* 2505, *Compton* 14731, *Esterhuysen* 3009; Strand Kloof, *Barker* 2471; Ratel River, *Compton* 14773; Sandhoogte Farm, *Smith* 3003; Agulhas, *Ecklon and Zeyher* 908 (cotypes of *A. glabra* in S. Afr. Mus. and Stockholm), *Esterhuysen* 7624; near Struys Bay, *Esterhuysen* 7623; Potberg, *Compton* 19536.—CALEDON DIV.: Houwhoek, *Ecklon and Zeyher* 899 (cotypes of *A. Eckloniana* in S. Afr. Mus. and Stockholm), *MacOwan* in S. Afr. Mus. Herb. 14490, *Pillans* 9858, *Bolus* 9922 (type of *A. brevistrigillosa* in Kew Herb., cotype in Bolus Herb.); between Bot River and Onrust River, *Zeyher* 2169; Hottentots Holland Mts., *Ecklon and Zeyher* 894 (cotypes of *A. hyponeura* in S. Afr. Mus. and Stockholm), *Hutchinson* 316; Klein River Mts., *Ecklon and Zeyher* 898 partly (cotype of *A. Bartlingiana* in Stockholm); near Gansbaai, Baviaansfontein, *Stokoe* 8275; Onrust River, *Esterhuysen* 4249; Rooi Els, *Compton* 15997, *Esterhuysen* 14101, *Leipoldt* 4176, *Leighton* in Bolus Herb. 23989; Frikiesbaai, *Leighton* 2510; near Stanford, Platrug, *Compton* 18248; Hanglip, *Compton* 13560; near Hawston, *Schlechter* 9478; near Elgin, *Bolus* 5143, *Compton* 16523, *Leighton* 812; Babylons Tower, *Bolus* 9898; near Caledon, *Bolus* 9892 (type of *A. pulcherrima* in Kew Herb., cotype in Bolus Herb.).—CAPE DIV.: Simon's Bay, *Wright* 649; hills near Simonstown, *Lamb* 2656; Hout Bay, *Bond* 442, *Compton* 5314, 11291, 13332, *Esterhuysen* 7645, *Schlechter* 1217; near Llandudno, *Hutchinson* 546; Hout Bay Nek, *Hutchinson* 101; Karbonkelberg, *Compton* 6397, 6398, 13269, 13290, 13630, *Esterhuysen* 7978; Cape Flats, *Isaac* in Bolus Herb. 23990; Cape of Good Hope, *Esterhuysen* 7979, *Fries*, *Norlindh and Weimarck* 1676; near Kommetje, *E. Pillans* in *Pillans* Herb. 1930, *Salter* 6378, *Walgate* 49; Klein Rondevlei, *Walgate* 64; above Buffels Bay, *Esterhuysen* 7980, *Walgate* 62; hills near Fish Hoek, *Bolus* 4840, *Walgate* 50; Glencairn, *Esterhuysen* 6014; Zwartklip, *Compton* 18136, *Leighton* 1781; flats 3 miles east of Mowbray, *Pillans* 1901; Lion's Head and Table Mt., *Ecklon and Zeyher* 895; Hangberg, *Pillans* 8986; Durbanville, *Acocks* 2537, 4972, *Barker* 1762; Kanonberg, *Pillans* 6642; near mouth of the Eerste River, *Pillans* 9992.—CLANWILLIAM DIV.: Cederberg, *Algeria*, *Levyns* 2192; east slopes of Grasruggens Mt., *Pillans* 8721.—HUMANSDORP DIV.: mountains near Humansdorp, *Kennedy* in S. Afr. Mus. Herb. 30728; Assegai Bush, *Esterhuysen* 6725.—MALMESBURY DIV.: Geelbek, *Barker* 4611; Riebeeck Kasteel, *Compton* 11714, *Esterhuysen* 6047; between Groenkloof and Saldanha Bay, *Drège* 7087; Bokbaai, *Esterhuysen* 3828; Groenkloof and Zwartland, *Ecklon and Zeyher* 897.—MOSSEL BAY DIV.: near the mouth of the Gouritz River and at Fish Bay, *Drège* 7091 (type of *A. gibbosa* in Kew Herb., cotypes in Lund, S. Afr. Mus. Herb. and Stockholm).—PAARL DIV.: Paarl Mt.,

Drège 7106 partly; west entrance to Du Toit's Kloof, *Pillans* 8474; ravine below Haalhoek Spitzkop, *Esterhuysen* 13516, 13517; Haalhoek Sneeuwkop, *Esterhuysen* 9569, 9576; Du Toit's Kloof, *Esterhuysen* 9691, 12347; Dal Josaphat, *Tyson* 916; French Hoek Pass, *Compton* 5784, *Levy's* in *Bolus* Herb. 23960, *Bolus* 22925; French Hoek, *Lamb* 2193; Wemmershoek Peak, *Esterhuysen* 11233.—PIKETBERG DIV.: Kapiteins Kloof, *Pillans* 8018, *Stokoe* 8285; slopes near Goedverwacht, *Bolus* 8423 (type of *A. hortensis* var. *spontanea* in *Bolus* Herb.).—RIVERSDALE DIV.: Albertinia, *Rogers* 16701; between Albertinia and the coast, *Muir* 1109; near Albertinia, "Kleinplaats," *Muir* 1626; coast belt, Elandskop, *Muir* 4488; hills at Melkhoutfontein, *Muir* 2443 (possibly a cross with *A. Dielsiana*), 5035; Landkraal, *Muir* 4490.—ROBERTSON DIV.: Bushmans Kloof Pass, *Compton* 11900, 11903, *Levy's* 9217; between McGregor and Stormsvlei Kloof, *Barker* 1152, *Esterhuysen* 7628.—STELLENBOSCH DIV.: Jonkershoek, *Levy's* 7384, *Walgate* 69, 1004; Hells Hoogte, *Walgate* in *Bolus* Herb. 23994; flats at Faure, *Esterhuysen* 1934; above "Lourensford," *Esterhuysen* 1427, *Stokoe* 8951; Sir Lowry's Pass, *Levy's* 2543, *Barker* 2513, *Acocks* 5209, *Bolus* 5566, *Guthrie* 2480; Helderberg, *Esterhuysen* 14640, *Parker* 4255, *Pillans* 9995; "Elsenburg," *Penfold* 149, 150; Stellenbosch, *Duthie* 18613; Stellenbosch Mt., *Garside* 194; Somerset West, *Parker* 3540, 3712; near mouth of the Eerste River, *Pillans* in *Bolus* Herb. 18451; near Somerset Strand, *Parker* 3580; Simonsberg, *Compton* 14198; Steenbras River Mouth, *Walgate* 286.—SWELLENDAAM DIV.: Breede River, *Mund* 6; Swellendam *Henrici* 3697, *F. Bolus* in *Bolus* Herb. 7306; Sondagsvlakte, *Ecklon and Zeyher* 876; Rivier Zonder Einde Peak, *Stokoe* 9065; Langebergen, *Bolus* 7306; Voormansbosch, *Ecklon and Zeyher* 2618.—TULBAGH DIV.: Nieuwe Kloof, *Burchell* 989 partly; Ceres Road (Wolsley), *Schlechter* 8978; slopes above Saron, *Schlechter* 10670, *Stokoe* 8281; Tulbagh, *L. Bolus* in *Bolus* Herb. 14020, 16288; near Tulbagh Waterfall, *Hutchinson* 386.—WORCESTER DIV.: between Bain's Kloof and Worcester, *Leighton* 1989; Brandwacht, *Esterhuysen* 8168; Bain's Kloof, *Grant* 2289.

Flowering Jan.—Dec. This is one of the most plastic and variable species with a continuous series of leaf-shapes connecting the extremely wide, in some of the coastal forms, with the extremely narrow, in some of the inland forms. The shapes of the petals and staminodes have no constant relation to the shapes of the leaves or sepals. It has not been possible to isolate any reliable combinations of characters which could be used in forming varietal groups.

67 (a). *A. propinqua* *Sond. in Harv. and Sond. Fl. Cap.* i, 423 (1860)!; *Dümmer in Fed. Rep.* xi, 408 (1912). *Hartogia propinqua* *O. Kze. Rev. Gen.* i, 101 (1891).

A low shrub rarely exceeding 30 cm. in height. Branchlets puberulous or pubescent. Leaves 3·5–6 mm. long, alternate, ascending or erect-spreading, lanceolate or ovate-lanceolate, obtuse or acute, rounded at the base, concave above, with stalked glands on the margin, usually ciliate, with a prominent keel slightly swollen behind the apex, with inconspicuous glands beneath, usually pilose on the keel. Flowers in terminal clusters. Peduncles mostly 4 mm. long, glabrous, usually with stalked glands, bracteolate on the lower half. Sepals 2 mm. long, ovate, obtuse, widely membranous at the margin, obtusely keeled, often with stalked glands beneath. Petals 4·5–5 mm. long; blade elliptic, very obtuse, concave above on the upper half; claw $\frac{1}{2}$ – $\frac{2}{3}$ as long, linear, ciliate or glabrous. Stamens glabrous. Staminodes 3–3·5 mm. long, lanceolate, attenuate, gland-tipped, cuneate at the base, slightly concave above, pubescent above and beneath on the lower half. Disk closely embracing the ovary. Ovary minutely glandular, pilose on the apex, with 3 carpels bearing oblong pilose processes. Style glabrous.

PAARL DIV.: Paardeberg, east slopes, *Pillans* 7658; Joostenberg, north-west slopes, *Pillans* 9993.—STELLENBOSCH DIV.: sandy flats between the Tigerberg and Zandhoogte (base of Simonsberg), *Drège* 7092 (type, in Stockholm, cotype in Kew Herb.); Stellenbosch, *Duthie* 551; roadside near west end of Bottelary Hills, *Pillans* 9782, *Salter* 8459 A.

Flowering July–Sept. This may be a local form of *A. serpyllacea* confined to sandy flats in the divisions of Paarl and Stellenbosch.

68. **A. Cerefolium** Bartl. and Wendl. *Diosm.* 159 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 424 (1860) incl. vars. *glandulosa*, *glabrata*!; *Dümmer in Fed. Rep.* xi, 409 (1912). **Diosma Cerefolia** Vent. *Jard. Malm.* 93, t. 93 (1804). **D. Cerefolium** Ait. *Hort. Kew.* ed. 2, ii, 31 (1811); *DC. Prodr.* i, 715 (1824). **Bucco Cerefolium** Roem. and Schultes, *Syst. Veg.* v, 439 (1819). **Agathosma microphylla** G. F. W. Mey. ex Bartl. and Wendl. *Diosm.* 173!; *Sond. op. cit.* 423, incl. var. *stadensis*; *Dümmer op. cit.* 408. **A. Patens** Hort. ex Bartl. and Wendl. *Diosm.* 159. **A. stadensis**, **A. suaveolens** Eckl. and Zeyher, *Enum.* 113 (1835)!. **A. Bartlingiana** Eckl. and Zeyher, *Enum.* 114! partim, excl. syn. **A. obtusa** E. Mey. in *Drège*, *Zwei Doc.* 116, 162 (1844)! nomen, non Bartl. and Wendl. **A. obtusifolia** Presl, *Bot. Bemerk.* 31 (1844)! nomen. **A. Thunbergiana** Sond. var. *patula op. cit.* 425! **A. melaleucoides** Sond. *op. cit.* 431! **Hartogia Cerefolia**, **H. melaleucoides**, **H. microphylla** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets puberulous, sometimes very minutely so. Leaves 2–8 (mostly 3–5) mm. long, alternate, erect-spreading or sometimes spreading, usually somewhat recurved, linear, oblong, elliptic-oblong, lanceolate, oblong-lanceolate, elliptic or ovate, obtuse or acute, rounded at the base,

slightly concave, flat or sometimes slightly convex above, often gland-crenate at the margin, with scattered glands and a raised nerve beneath, sometimes slightly gibbous behind the apex, glabrous, puberulous beneath or on the margin, pilose on the margin and beneath on the nerve or tipped with long hairs, sometimes with stalked glands on the margin. Flowers in terminal clusters. Peduncles 2.5–6 mm. long, glabrous, puberulous or pubescent, sometimes with stalked glands, bearing bracteoles on the lower half. Sepals 1–1.25 mm. long, ovate, obtuse, rounded beneath, glabrous or sometimes tipped with a hair, or \pm pilose-ciliate, very rarely with stalked glands. Petals 3–5 mm. long; blade elliptic or obovate-oblong, obtuse, glabrous, or sparsely pubescent above on the nerve, often with a gland behind the apex; claw half as long to equal in length, narrowly linear, \pm ciliate. Stamens glabrous. Staminodes 1.75–3.25 mm. long, lanceolate or lanceolate-linear, acuminate, tipped with a gland, tapering towards the base, concave above, ciliate. Ovary with 3 carpels bearing rotund or widely obovate glabrous or pilose processes. Style glabrous.

South Africa: without precise locality; *Mund* (type of *A. melaleucoides* in Kew Herb., cotype in Stockholm), *Hesse* (cotype of *A. microphylla* in Stockholm).—BREDASDORP DIV.: Frikkie's Bay, *Compton* 18201; hills near Bredasdorp, *Bolus* 19163; Elim, *Guthrie* 2850; The Poort, *Compton* 9027, 19563; Hagelkraal River, *Leighton* 2525; near Agulhas, *Ecklon* and *Zeyher* 890 (cotype of *A. Thunbergiana* var. *patula* in S. Afr. Mus. Herb. and Stockholm).—CALEDON DIV.: Genadendal, *Drège* (cotype of *A. Cerefolium* var. *glabrata* in Kew Herb.), *Bauer* in Marloth Herb. 6616; top of Baviaans Kloof, *Burchell* 7885, *Stokoe* 2523; near Elgin, *Stokoe* 8294; Zonder Einde Peak, *Stokoe* 8950, 9366; Kleinrivier Mt., *Ecklon* and *Zeyher* 891.—GEORGE DIV.: near George, *Bolus* 13935, *Schlechter* 5773; 5 miles east of George, *Hutchinson* 1291; Montagu Pass, *Schlechter* 5797.—HUMANSDORP DIV.: flats at Zuur Anys, *Fourcade* 3026; Zoet Rug, Rob Hoek, *Fourcade* 1444.—KNYSNA DIV.: Commonage, *Keet* in Forest Dept. Herb. 2190; Biervlei Forest, *Forest Dept. Herb.* 2075; Woodville Forest, *Forest Dept. Herb.* 2076; Belvedere, *Duthie* 841; Clarkson, *Thode* A769; Barrington, *Galpin* 3868, 3871; near Knysna River, *Tyson* 2970, in Herb. Norm. Austr.-Afr. 997; near Keurbooms River, between Cloete's Kraal and Paarde Kraal, *Burchell* 5166; Plettenberg Bay, *Rogers* 26733; flats west of Storms River Mouth, *Fourcade* 512; flats at Oudebosch, *Fourcade* 872; Paardekop, *Fourcade* 3479.—MOSSEL BAY DIV.: between Nowsaramma River and Great Brak River, *Burchell* 6133; west side of drift at Great Brak River, *Burchell* 6155; Robinson's Pass, *Britten* 165.—PRINCE ALBERT DIV.: Seven Weeks Poort, *Compton* 4031.—RIVERSDALE DIV.: De Hoek, *Muir* 2954; Corenti

River Farm, Muir 5066; Garcia's Pass, Thorne in S. Afr. Mus. Herb. 41623.—SWELLENDAM DIV.: Tradouw Pass, Levyns 642; Puspasvlei, Ecklon and Zeyher 888 (cotype of *A. suaveolens* in S. Afr. Mus. Herb.).—UNIONDALE DIV.: Prince Alfred's Pass, Fourcade 5861.

Flowering July—Dec. The typical and apparently least common form seems to be confined to the northern part of the Caledon Division.

69. **A. bicornuta** R. A. Dyer in *Kew Bull.* (1934) 269!

Branchlets puberulous. Leaves 2—6 mm. long, alternate, ascending, slightly recurved above the middle, ovate or ovate-lanceolate, obtuse, rounded at the base, slightly concave above, slightly convex and with many scattered glands beneath, glabrous. Flowers in terminal clusters. Peduncles 2·5—3 mm. long, glabrous, or sparsely pubescent on the upper half, with linear bracteoles on the lower half. Sepals 0·75 mm. long, oblong or deltoid-oblong, obtuse, convex beneath, glabrous. Petals 3—3·5 mm. long; blade obovate, \pm pubescent above on the nerve, with a gland behind the apex; claw about as long, cuneate-linear, ciliate. Stamens glabrous. Staminodes 2·5 mm. long, linear, obtuse, tapering to a filiform base, tipped with a gland, pilose above on the lower half. Ovary glabrous, with 2 or, sometimes, 3 carpels bearing oblong processes. Style glabrous.

ALBANY DIV.: Botha's Berg, MacOwan 560 (type, in Albany Mus., cotypes in Bolus Herb. and S. Afr. Mus. Herb.); "Hounslo" farm, Galpin 75.—SOMERSET EAST DIV.: mountain above the spring at Commadagga, Burchell 3324.

Flowering July—Sept. This is very closely related to *A. Cerefolium* B. and W. Further collecting may show that the two species are forms of one with a variable number of carpels.

70. **A. minuta** Schldl. in *Linnaea* vi, 206 (1830)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 420 (1860); *Dümmer in Fed. Rep.* xi, 407 (1912). **Hartogia minuta** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets minutely pubescent. Leaves 1·5—2 mm. long, alternate, spreading or reflexed, elliptic, ovate or sometimes oblong-lanceolate, obtuse, slightly concave or slightly convex above, with an inconspicuous nerve and minute impressed glands beneath, sometimes with 1—3 long hairs on the apex. Flowers in terminal clusters. Peduncles 2·5—4 mm. long, glabrous or sparsely and minutely puberulous. Sepals 0·5—0·75 mm. long, rotund, glabrous. Petals 2·5 mm. long; blade elliptic or obovate, sometimes with a few hairs above on the nerve; claw half as long, narrowly linear, glabrous. Stamens glabrous. Staminodes 1 mm. long, lanceolate, tapering towards the base, gland-tipped, pubescent above.

Ovary with 3 carpels bearing rotund sometimes pilose processes. Style glabrous.

BREDASDORP DIV.: near the Potberg, Karsrivier, *Ecklon and Zeyher* 886 (cotype in S. Afr. Mus. Herb.); The Poort, *Barker* 2482, *Acocks* 1782; Vogelvlei, *Leighton* in *Bolus* Herb. 21123, *Levy's* 4539; between Klooster and BovenDrift, "Nachwacht," *Smith* 2971, 4264; flats between Bredasdorp and Struys Bay, *Esterhuysen* 2968; coastbelt between Agulhas and Potberg, *Drège* 7121.—**SWELLENDAM DIV.:** Storms Vlei Kloof, *Lewis* in *Bolus* Herb. 23970.

Flowering June—Sept. A close affinity with *A. Cerefolium* is the reason for the two species often being confused. The size and shape of the sepals seem to be the best superficial characters for distinction.

71. *A. orbicularis* *Barthl. and Wendl. Diosm.* 175 (1824)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 419 (1860); *Dümmer in Fed. Rep.* xi, 407 (1912). ***Diosma orbicularis*** *Thunb. Prodr.* i, 84 (1794)!; *ej. Diss. Diosm.* 17 (1797); *Willd. Sp. Pl.* i, 1140 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Ait. Hort. Kew.* ed. 2, ii, 33 (1811); *Roem. and Schultes, Syst. Veg.* v, 460 (1819); *Thunb. Fl. Cap. ed. Schultes* 230 (1823); *DC. Prodr.* i, 714 (1824). ***Hartogia orbicularis*** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets slender-wiry, puberulous. Leaves 1.5 mm. long, alternate, spreading or reflexed, widely ovate, rotund or cordate, subacute or obtuse, slightly convex or flat above, often somewhat revolute at the margin, gibbous behind the apex, glabrous, with a few small glands and a slightly raised nerve beneath. Flowers in terminal clusters. Peduncles about 3.5 mm. long, puberulous, with slender bracteoles on the lower half. Sepals 0.5—0.75 mm. long, rotund, obtuse, minutely ciliate, convex and with distinct glands beneath. Petals 2 mm. long, glabrous; blade elliptic, obtuse; claw half as long, linear. Stamens glabrous. Staminodes about 1.75 mm. long, oblong- or elliptic-lanceolate, with an apical gland, concave and pubescent above on the lower half. Ovary glabrous, with 3 carpels bearing rotund processes. Style glabrous.

South Africa: without precise locality, *Thunberg* (cotypes in Lund and Stockholm).—**CALEDON DIV.:** slopes of hills above the Hot Baths, *Ecklon and Zeyher* 885, *Bolus* 9910, *Levy's* 4388, *Marloth* 4261, *Pillans* 6693, *Purcell* in S. Afr. Mus. Herb. 45934.

Flowering July—Nov. This species is known only in a small area with ironstone formation, which is almost certainly where *Thunberg* collected the type.

72. *A. Dielsiana* *Schltr. ex Dümmer in Fed. Rep.* xi, 333 (1912)! incl. var.

Branchlets puberulous, pubescent or pilose. Leaves 3—5 mm. long, alternate, erect-spreading, elliptic, oblong, elliptic- or ovate-oblong, ovate- or oblong-lanceolate, or ovate, obtuse or subacute, rounded at the base, \pm convex above, slightly revolute and sometimes sparsely pilose at the margin, gibbous behind the apex, sometimes pilose beneath, with a scarcely raised nerve and inconspicuous glands. Flowers in terminal clusters. Peduncles about 3 mm. long, glabrous or sparsely pubescent, with bracteoles at or near the middle. Sepals 1.25—1.5 mm. long, ovate-lanceolate, obtuse, ciliate, glabrous, or pubescent beneath, sometimes pilose at the apex, with a keel decurrent on the tube of the calyx. Petals 3—4 mm. long; blade narrowly obovate, ciliate on the lower half; claw about $\frac{1}{4}$ as long, linear, glabrous. Stamens glabrous. Staminodes 2.5—3 mm. long, lanceolate, attenuate, gland-tipped, with a narrow tapering basal part, pubescent at the middle. Ovary tubercled on the upper half, sometimes pilose at the middle, with 3 carpels bearing elliptic-oblong processes. Style glabrous.

South Africa: without precise locality, *Thom* 516 (type of var. in Kew Herb.).—BREDASDORP DIV.: near Mierkraal, *Schlechter* 10522; Agulhas, *Schlechter* 10558 (type in Kew Herb., cotypes in Albany Mus. and National Herb.); Cape Infanta, on limestone, *Walgate* 873; Kathoek, limestone hills, *Pillans* 9307.—GEORGE DIV.: near Hartenbosch River, on sand dunes, *Young* in Bolus Herb. 5511; Wilderness, on sand dunes, *Compton* 15827, *Levy* 4295, 5015.—MOSSEL BAY DIV.: Little Brak River, *Lewis* in Bolus Herb. 23954; Mossel Bay, *Rogers* 4174.—RIVERSDALE DIV.: Still Bay, *Laver* in Bolus Herb. 23955, *Muir* 2449, 5173; Melkhoutfontein, *Galpin* 3870, 3872; without precise locality, *Marloth* 3554.

Flowering April—Oct. *Pillans* 9307 is a form with unusually much divided branches and with unusually small leaves. These unusual characters may have developed in consequence of the arid conditions of the locality.

73. A. Muirii *Phillips in Ann. S. Afr. Mus.* ix, 117 (1913)!

Branchlets puberulous. Leaves 3—6 mm. long, alternate, spreading or slightly reflexed, oblong-lanceolate, ovate, rotund or orbicular, obtuse, rounded or subcordate at the base, slightly convex, flat or slightly concave above, often thickened and sometimes minutely tubercled and pilose-ciliate at the margin, elsewhere glabrous, with a slightly raised nerve and many scattered glands beneath, slightly gibbous behind the apex. Flowers in terminal clusters. Peduncles 3—4 mm. long, papillate, with bracteoles on the lower half. Sepals 1—1.25 mm. long, oblong, obtuse, concave above, ciliate, with many glands beneath, with a keel extending

down to the apex of the peduncle. Petals 3·5—4·5 mm. long; blade elliptic, elliptic-oblong or elliptic-ovate, very obtuse, sometimes pilose above on the nerve; claw $\frac{1}{3}$ as long, narrowly linear, ciliate. Stamens with filaments \pm ciliate on the lower half. Staminodes 2·5—3 mm. long, linear, attenuate at both ends, tipped with a gland, ciliate, pubescent above on the middle. Ovary glabrous, glandular on the apex, with 3 carpels bearing rotund processes. Style glabrous.

RIVERSDALE DIV.: Still Bay, *Muir* 635, in S. Afr. Mus. Herb. 4997 (type); Buffelshoek, near the sea, *Muir* 1107; Plattebosch, *Muir* in Galpin Herb. 5174; Yzervarkfontein, near the sea, *Muir* 1092.

Flowering May—July.

74. *A. riversdalensis* Dümmer in *Ann. Bolus Herb.* iii, 57 (1920)!

A low shrub usually 30—35 cm. high, with puberulous branchlets. Leaves 2·5—3·5 mm. long, alternate, erect-spreading, ovate, obtuse, rounded or subcordate at the base, convex or flat above, glabrous, or sometimes pilose on the margin, gibbous behind the apex, with a few scattered glands and a slightly raised nerve beneath. Flowers in terminal clusters. Peduncles 3 mm. long, puberulous, with linear ciliolate bracteoles at the middle. Sepals 1·25 mm. long, widely oblong, very obtuse, slightly cucullate above, ciliate, rounded and with a few raised glands beneath. Petals 4 mm. long; blade elliptic- or obovate-oblong, very obtuse, ciliate on the lower half; claw $\frac{1}{4}$ as long, linear, glabrous. Stamens glabrous. Staminodes 2·5 mm. long, narrowly linear near the base, thence lanceolate upwards, terminating in a large gland, densely pubescent above and beneath at the middle. Ovary glabrous, with 3 carpels bearing obovate-oblong processes. Style glabrous.

BREDASDORP DIV.: Marcus Bay, Wagenhuis Kraal, *Fry* in Galpin Herb. 4953.—RIVERSDALE DIV.: at the Gouritz River, Melkhoutfontein, *Muir* 1111 (type, in Bolus Herb., cotype in S. Afr. National Herb.); Zoutpan, *Muir* 1103; near Albertinia, Oude Tuin and on dunes not far from the sea, *Muir* 928; Albertinia Commonage, *Muir* 2009.

Flowering April—Sept. This species is obviously very closely related to the older species *A. Dielsiana* and *A. Muirii*. The three species may be forms of one.

75. *A. pallens* sp. nov.; ramulis glabris; foliis alternatis subimbricatis linearibus vel lanceolato-linearibus subacutis vel obtusis glabris vel apice pubescentibus, supra concavis, subtus convexis; floribus terminalibus vel inferioribus axillaribus; pedunculis glabris bracteolatis; sepalis oblongo-ovatis vel ovatis obtusis saepe sparse ciliatis, supra sparse pubescentibus; petalis obovatis ovatis vel rotundis, infra medium lineari-

bus pubescentibus; staminibus glabris; staminodis oblanceolato-linearibus ciliatis, apice glandula notatis; ovario 3-loculari glabro cornubus rotundatis; stylo glabro.

Branchlets glabrous. Leaves 3·5—6 mm. long, alternate, ascending or erect, subimbricate, linear or lanceolate-linear, subacute or obtuse, rounded at the base, concave above, rounded and with scattered glands beneath, glabrous or sometimes with a few apical hairs, grey-green. Flowers in terminal clusters, or the lower axillary. Peduncles 2·5—4 mm. long, glabrous, with very slender ciliate bracteoles about the middle. Sepals 0·75—1·5 mm. long, ovate or oblong-ovate, obtuse, concave and sparsely pubescent above, rounded beneath, often sparsely ciliate, with a ridge at the base extending to the peduncle. Petals 3—4·5 mm. long; blade obovate, ovate or rotund, very obtuse, with a gland behind the apex; claw $\frac{1}{2}$ — $\frac{3}{4}$ as long, linear, pubescent above. Stamens glabrous. Stamines 2·25 mm. long, oblanceolate-linear, tipped with a large gland, ciliate, tapering to a slender glabrous base. Disk crenulate. Ovary glabrous, with 3 carpels bearing rotund processes. Style glabrous.

RIVERSDALE DIV.: Albertinia, *Stokoe* 8294 (type, in Bolus Herb.), Muir 1253, *Walgate* in Bolus Herb. 23971.

Flowering Nov.—Febr. The affinity is with *A. Dielsiana* from which it is distinguished by very differently shaped leaves.

76. *A. latipetala* Sond. in *Harv. and Sond. Fl. Cap.* i, 422 (1860)! incl. var. *Hartogia latipetala* O. Kze. *Rev. Gen.* i, 101 (1891). *A. florifera* Dümmer in *Fed. Rep.* xi, 409 (1912)!

Branchlets puberulous. Leaves usually 2·5—3 mm. long, alternate, reflexed, oblong- or ovate-lanceolate, or ovate, obtuse, rounded at the base, \pm concave or almost flat above, glabrous or sometimes sparsely ciliate, slightly thickened at the margin, nerve-keeled, with immersed glands on the keel and margin. Flowers in terminal clusters. Peduncles 3—4 mm. long, glabrous or \pm puberulous, sometimes with minute glandular hairs, with slender bracteoles on the lower half. Sepals 1·25—2 mm. long, ovate or ovate-lanceolate, subacute, rounded beneath, narrowly membranous and often ciliate at the margin, sometimes setose at the apex and on the nerve beneath. Petals 3·5—4 mm. long, glabrous; blade elliptic or obovate-elliptic, sometimes subcordate at the base, very obtuse; claw $\frac{1}{2}$ — $\frac{3}{4}$ as long, linear. Stamens with filaments ciliate on the lower half. Stamines 2·5 mm. long, lanceolate, obtuse, cuneate at the base, concave and pubescent above, with a gland behind the apex. Ovary with 3 carpels bearing widely oblong or subclavate sometimes setose processes. Style glabrous.

South Africa: without precise locality, *Niven* (type of *A. latipetala* in

Stockholm).—MALMESBURY DIV.: hills between Mamre and Darling, *Bolus* 12639, *Leighton* in *Bolus* Herb. 13933, *Compton* 9432, 13730, 14934, *Esterhuysen* 3809, 12973, *Pillans* 6898; Malmesbury, *Compton* 7807, 19939, *Gillett* 3616; near Moorreesberg, *Bolus* 9955 (cotype of *A. florifera* in *Bolus* Herb.); between Mamre and Malmesbury, *Walgate* in *Bolus* Herb. 13934.—PAARL DIV.: Joostenberg, north slopes, *Pillans* 8104.—PIKETBERG DIV.: without precise locality, *Edwards* 263; Saron, *Leipoldt* in *Bolus* Herb. 18618.

Flowering Aug.—Oct. There are specimens of this species, collected by Schlechter, in the Albany Mus. and *Bolus* Herb., which were labelled by him "8393, Steenbras River, 1000', 13, x, '94." The locality is very doubtful.

77. ***A. florida*** *Sond. in Harv. and Sond. Fl. Cap.* i, 424 (1860)! ***A. mollis*** *Eckl. and Zeyher ex C. Muell. in Walp. Ann.* vii, 514 (1869)! ***Hartogia florida*** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets sparsely pubescent. Leaves 4—5 mm. long, alternate, crowded, spreading, lanceolate, subacute, rounded at the base, slightly convex above, denticulate and at first pilose at the scarcely recurved margin, with a slightly raised and at first pilose nerve beneath. Flowers in terminal clusters. Peduncles 3.5 mm. long, glabrous, with bracteoles on the lower half. Sepals 1 mm. long, ovate-lanceolate, obtuse, obtusely keeled, glabrous. Petals 4.5—4.75 mm. long; blade oblong-ob lanceolate, very obtuse, sparsely pubescent above, ciliate on the lower half; claw about 1 mm. long, linear. Stamens glabrous. Stamines 4 mm. long, lanceolate-linear, obtuse, ciliate on the lower half, linear and glabrous at the base. Ovary with 3 carpels bearing linear-oblong processes pilose at the apex. Style glabrous.

SWELLENDAM DIV.: hills near Riet Kuil, *Mund* in *Ecklon and Zeyher* Herb. 879.

Flowering Sept. The affinity is with *A. ciliaris* Druce, of which it may be a form with the leaves convex above, and with differently shaped petals.

78. ***A. venusta*** *comb. nov. Barosma venusta* *Eckl. and Zeyher, Enum.* 102 (1835)!; *Bartl. in Linnaea* xvii, 362 (1843); *Sond. in Harv. and Sond. Fl. Cap.* i, 395 (1860); *Engl. in Engl. and Prantl, Pflanzenfam.* iii, §4, p. 148 (1896).

Branchlets warted, puberulous. Leaves mostly 6—8 mm. long, alternate, erect-spreading, obovate, widely obovate, rotund or sometimes ovate, elliptic or ovate-lanceolate, very obtuse, rounded or widely cuneate at the base, flat or slightly concave above, glabrous, or puberulous on the petiole, obtusely serrate and thickened at the margin, with a raised nerve and scattered glands beneath. Flowers 2—5 together clustered at

the ends of very short bracteolate stipes in the axils of the upper leaves. Peduncles 4—5 mm. long, minutely puberulous, with a few prominent glands, with linear bracteoles on the lower half. Sepals 0·75 mm. long, deltoid-ovate, obtuse, rounded and minutely puberulous beneath. Petals 3·5 mm. long, oblanceolate or oblong, tapering to an obtuse base, concave above, incurved at the apex, glabrous, with a large gland behind the apex and several below. Stamens glabrous. Stamines 2·75 mm. long, linear, dorsally compressed, glabrous, tipped with a large gland. Disk inconspicuous, crenulate. Ovary distinctly raised on a stout stipe, glabrous, with 3 or sometimes 4 carpels bearing conical-oblong glandular processes. Style glabrous, much recurved.

ALBANY DIV.: Stone's Hill, *Schönland* 353; Coldspring, *Britten* 3431, 5434, *Daly and Sole* 263, *Story* 3161; Dassie Krantz, *Dyer* 148; between Howieson's Poort and Brookhuizen's Poort, *MacOwan* 1008; hills at Brookhuizen's Poort, *Galpin* 79, *MacOwan* 442; Manley Flats, *Leighton* 2626.—GRAAFF-REINET DIV.: Sneeuwberg, *Bolus* 2576.—HUMANSBURG DIV.: Rietvlei, *Esterhuysen* 6654b; Blueberg Loerie Plantation, *Dix* 12; Kruisfontein Mt., *Galpin* 3867.—MURRAYSBURG DIV.: Koudeveld, *Tyson* 480.—UITENHAGE DIV.: Van Staaden's Mts., *Bolus* 1602, *Paterson* 895, *Ecklon and Zeyher* 807 (cotype in S. Afr. Mus. Herb.), *Zeyher* 2156; Witte Klip, *Holland* 3582, *Long* 1402; Zuurberg, *Long* 1084, *Paterson* 56; Elands River, Melkhoutboom, *Long* 1389.—UNIONDALE DIV.: Joubertina Mts., *Esterhuysen* 7062, 7063, 10634; Die Hoek, *Esterhuysen* 16355; Kouga Peak, *Esterhuysen* 16274.

Flowering July—Jan. The upper flowers, mostly bisexual, appear to develop first. The lower flowers are mostly unisexual.

79. *A. thymifolia* Schldl. in *Linnaea* vi, 205 (1830); *Sond. in Harv. and Sond. Fl. Cap.* i, 420 (1860); *Dümmer in Fed. Rep.* xi, 407 (1912). *Hartogia thymifolia* O. Kze. *Rev. Gen.* i, 102, (1891).

A low shrub. Branchlets minutely puberulous on strips alternating with the bases of the leaves. Leaves 3·5—4 mm. long, alternate, erect-spreading or spreading, obovate, obovate-oblong or rotund, rounded at the base and apex, dorsally compressed, slightly convex above, slightly recurved at the margin, glabrous, with impressed glands and a slightly raised nerve beneath, \pm gibbous behind the apex. Flowers in terminal clusters. Peduncles 4—4·5 mm. long, sparsely puberulous, with small bracteoles on the lower half. Sepals 1·5 mm. long, oblong-lanceolate, obtuse, glabrous, convex and with raised glands beneath. Petals 4 mm. long, glabrous; blade obovate-oblong, very obtuse; claw half as long, narrowly linear. Stamens glabrous. Stamines 3—3·5 mm. long, oblanceolate-linear in the upper half, acute, narrowly linear and sparsely

ciliate in the lower half, tipped with a minute gland. Ovary minutely tubercled, with 3 carpels bearing rotund slightly retuse processes. Style glabrous.

MALMESBURY DIV.: Saldanha Bay, Baron von *Ludwig* (type); on dunes at Saldanha Bay, *Ecklon and Zeyher* 883; between Mamre and Saldanha Bay, *Drège* 7119; Geelbek, *Barker* 4626, *Compton* 19890.

Flowering Aug.—Oct. This species resembles *A. lanceolata* in several important characters. The two species are closely related and probably have a common ancestry.

80. *A. ciliata* *Link*, *Enum. Hort. Berol.* i, 238 (1821—22); *Bartl. and Wendl. Diosm.* 155 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 425 (1860); *Thonner, Blütenpfl. Afr.* t. 74 (1908); *Dümmer in Fed. Rep.* xi, 411 (1912); *Thonner, Fl. Pl. Afr.* t. 73 (1915); *Marloth, Fl. S. Afr.* ii, t. 36, f. c (1925); *Walgate in Fl. Cape Peninsula* 540 (1950). [*Thymelaea* etc. *Seba, Thes.* ii, 19, t. 17, f. 5 (1735)]. *Diosma ciliata* *Linn. Sp. Pl.* ed. 1, i, 198 (1753) incl. syn.; ed. 2, i, 287 (1762) incl. syn.; *Berg. Pl. Cap.* 66 (1767); *Lam. Encycl.* ii, 287 (1786); *Linn. Syst. Nat.* ed. 13, ii, 409 (1796) incl. syn.; *Murr. Syst. Veg.* 250 (1797) excl. syn.; *Ait. Hort. Kew.* ed. 2, ii, 30 (1811); *Ker-Gawl. in Edwards' Bot. Reg.* t. 366 (1819); *Roem. and Schultes, Syst. Veg.* v, 459 (1819); *DC. Prodr.* i, 715 (1824); *Spreng. Syst. Veg.* i, 786 (1825). [*Spiraea africanum* etc. *Pluk. Amalth.* iv, 197, t. 411, f. 3 (1769)]. *Hartogia ciliata* *O. Kze. Rev. Gen.* i, 100 (1891).

Branchlets pilose. Leaves 0·5—1·2 cm. long, alternate, erect-spreading, lanceolate, ovate-lanceolate or ovate, acute, rounded at the base, slightly concave, convex or flat and smooth above, usually somewhat revolute and crenulate with gland-based rather rigid cilia or glabrous, with a prominent nerve and scattered glands beneath, sometimes with a few long hairs on the nerve, often swollen behind the apex. Flowers in terminal clusters. Peduncles 3—6 mm. long, scabrid, glabrous, or with occasional hairs, with bracteoles on the lower half. Sepals 1·5—2·5 mm. long, ovate-lanceolate, obtuse, obtusely keeled, ciliate or glabrous. Petals 4—5 mm. long; blade oblong-elliptic; claw 1—1½ times as long, narrowly linear, sparsely ciliate near the base or glabrous. Stamens glabrous. Staminodes 3—4·5 mm. long, linear-oblong in the upper half, obtuse, concave above, narrowly linear and ciliate in the lower half, with a conspicuous gland behind the apex. Ovary glabrous, or pilose on the apex, with 2 carpels bearing oblong sparsely pilose or glabrous processes.

CAPE DIV.: Table Mt., *Burchell* 8400, 8423, *Ecklon and Zeyher* 878, *Bolus* 4580, *Garside* 192, *Esterhuysen* 7997, *L. Kensis* in Natal Herb. 11731, *Pillans* 8980, 8982, *Thode* A88, *Wasserfall* 130, *Rogers* 2457; above *Kirstenbosch Acocks* 1217, *Compton* 7517, 11188, *Esterhuysen* 210, *Hum-*

bert 9669; Penfold 211; Orange Kloof, Gamble 2226, 22097, Pillans 8983. Slangolie Gorge, Marloth 8463; Devil's Peak, Bolus 3940, in Herb. Norm; Austr.-Afr. 314, W. Dod 42, Marloth 137; Lion's Head Marloth 131, Pillans 8993, Tyson 2379.—WORCESTER DIV.: Du Toit's Kloof, Drège 7086; Bain's Kloof, Esterhuysen 1981, Stokoe 8084, Schlechter 9148; Bailey's Peak, Esterhuysen 8526, Stokoe 8270; Pic Blanc, Esterhuysen 8514.

Flowering April—Sept.

81. **A. ciliaris** Druce in Rep. Bot. Exchange Club Brit. Isles 1916, p. 603 (1917); Walgate in Fl. Cape Peninsula 541 (1950). **Hartogia ciliaris** Linn. Syst. Nat. ed. 12, ii, 625 (1767). **Diosma ciliata** Lam. Encycl. Meth. ii, 287 (1786) excl. syn. **D. rugosa** Thunb. Prodr. Pl. Cap. 43 (1794); ej. Diss. Diosm. 412 (1797); Willd. Sp. Pl. i, 1139 (1798); Pers. Syn. Pl. i, 247 (1805); Roem. and Schultes, Syst. Veg. v, 459 (1819); Thunb. Fl. Cap. ed. Schultes 226 (1823); Spreng. Syst. Veg. i, 787 (1825). **Bucco obtusa** Wendl. Collect. i, 45 (1805); Roem. and Schultes op. cit. 438, excl. syn. Thunb., Berg. and Pluk. **Agathosma pubescens** Willd. Enum. Hort. Berol. i, 259 (1809); Link, Enum. Hort. Berol. i, 238 (1821). **Diosma thymifolia** Willd. ex Roem. and Schultes, Syst. Veg. v, 462 (1819). **D. lanceolata** Ker-Gawl. in Edwards', Bot. Reg. t. 476 (1820) non Murray, excl. syn. mult.; DC. Prodr. i, 715 (1824). **Agathosma rugosa** Link, Enum. Hort. Berol. i, 238 (1821); Sond. in Harv. and Sond. Fl. Cap. i, 421 (1860); Dümmer in Fed. Rep. xi, 408 (1912) incl. var. **A. hybrida** Bartl. and Wendl. Diosm. 167 (1824)! **A. mollis** Bartl. and Wendl. Diosm. 168. **A. obtusa** Bartl. and Wendl. Diosm. 169, t. B. f. vii, A—H, excl. var. B. partim. **A. Bartlingiana** Eckl. and Zeyher, Enum. 114 (1835)! partim.

Branchlets verruculose, pubescent or villous. Leaves 4—8 mm. long, alternate, erect-spreading or spreading, lanceolate, oblong- or ovate-lanceolate, obtuse or subacute, rounded or subcordate at the base, slightly concave or furrowed and glabrous or pilose above, usually convex above near the slightly thickened and slightly revolute margin, with a prominent and often pilose nerve beneath terminating in a swelling behind the apex, often pilose-ciliate. Flowers in terminal clusters or the lower (in a cluster) in the axils of reduced leaves. Peduncles 3—7 mm. long, glabrous, \pm pubescent or with a mixture of hairs and stalked glands, with bracteoles on the lower half. Sepals 1.5—2 mm. long, ovate-lanceolate or ovate, obtuse or subacute, \pm membranous at the margin, glabrous or \pm ciliate, obtusely keeled on the upper half. Petals 4.5—5.5 mm. long; blade obovate or oblong-obovate, very obtuse, subcucullate at the apex, sometimes sparsely pilose above at the base; claw $\frac{2}{3}$ or as long, narrowly linear, ciliate. Stamens glabrous. Staminodes 3.5—4.5

mm. long, lanceolate, oblong- or linear-lanceolate, or oblong in the upper half, terminating in a round gland, tapering from the middle to the base, \pm pubescent above at the middle, ciliate except near the base and apex. Ovary glabrous, puberulous at the apex or sometimes with stalked glands, with 3 carpels bearing oblong or obovate-oblong pilose or glabrous processes. Style glabrous.

BREDASDORP DIV.: near Bredasdorp, *Bolus* 8474; Baardscheerdebosch, *Barker* 2473; Elim, *Guthrie* 3852; The Poort, *Compton* 14794.—CALEDON DIV.: Rooi Els, *Esterhuysen* 14126, *Compton* 17515, *Leighton* 1460, 1461, *Levyns* 9286; Palmiet River Mouth, *Levyns* 7760, *Compton* 3449, *Stokoe* 8006, *Barker* 1150; Hermanus, *Bolus* 9688, *Compton* 14236, 17965; Hanglip, *Compton* 13585; Shaw's Mt., *Gillett* 4453, 4454, 4455; Viljoen's Pass, *Salter* 4963; Klein River Mts., *Walgate* in *Bolus* Herb. 23940.—CAPE DIV.: without precise locality, *Harvey* 480, *Sieber* 59, *Thorn* 170, *Drège* 7126, *Ecklon* 290, *Thode* A87; Table Mt., north slopes, *MacOwan* in Herb. Norm. Austr.-Afr. 1820, *Phillips* 3828, *Marloth* 437, *Bolus* 4791, *Kies* 31, *Barker* 4083, *Rogers* 1099; Table Mt. and Devil's Peak, *Ecklon* and *Zeyher* 882; Devil's Peak, *Burchell* 8502, *Pillans* 8981; Lion's Head, *Compton* 12549, *W. Dod* 1171, *Rogers* 15580, *Tyson* 3046, *Walgate* 20; Vlakkeberg, *Walgate* 66; Clifton, *Barker* 1961; Little Lion's Head, *Walgate* 22; Karbonkelberg, *Compton* 13270; Llandudno, *Hutchinson* 547; Scarborough, *Walgate* 21; Skoorsteenkop, *Walgate* 29; Slangkop, *Walgate* 28; Muizenberg, *Bolus* 4633; hills at Fish Hoek, *Bolus* 7971; Simonstown hills, *Bolus* 4677, *W. Dod* 2769, *Compton* 17998; Zwartkop Range, *Pillans* 8987, *Walgate* 31; Vasco da Gama Peak, *Walgate* 18; Schuster's Bay, *Kies* 158; Olifants Bosch, *Compton* 15837, 17489; Bonteberg, *Compton* 8888, 9370; Buffels Bay, *Compton* 13350; Cape Point, *Compton* 6569.—STELLENBOSCH DIV.: Gordon's Bay, *Bolus* 23938; Sir Lowry's Pass, *Bolus* 4117, *Schlechter* 7810; mouth of Steenbras River, *Compton* 8027.

Flowering May—Dec. The present determination of this species is based on Linne's brief description of his *Hartogia ciliaris*, and it is supported by determinations made by Bartling, Wendland and Sonder.

82. *A. lanceolata* Engl. in Engl. and Prantl, *Pflanzfam.* iii, §4, p. 151 (1896); *Dümmèr* in *Fed. Rep.* xi, 407 (1912); *Walgate* in *Fl. Cape Peninsula* 541 (1950). *Hartogia lanceolata* Linn. *Syst. Nat.* ed. 12, p. 625 (1767). *Diosma lanceolata* Linn. *Mant. Alt.* 343 (1771); *ej. Syst. Nat.* ed. 13, ii, part 1, p. 409 (1796); *Murr. Syst. Veg.* 250 (1797). *Agathosma Wrightii* *MacOwan* in *Journ. Linn. Soc.* xxv, 386 (1890).

A low much branched shrub, often with spreading branches. Branchlets puberulous or shortly pubescent. Leaves mostly 4—6 mm. long,

alternate, spreading, often slightly recurved, oblong-elliptic, elliptic, ovate or subrotund, very obtuse, rounded at the base, slightly convex or flat above, dorsally compressed, ecarinate, with a few scattered glands beneath, thickened and with a row of glands at the margin, sometimes with long hairs arising on the marginal glands. Flowers in terminal clusters. Peduncles 5—6 mm. long, glabrous, with oblong-lanceolate obtuse bracteoles near the base. Sepals 1.5 mm. long, ovate, obtuse, membranous at the margin, glabrous, concave above, obtusely keeled, with scattered glands beneath. Petals 4—4.5 mm. long, glabrous or sparsely ciliate near the base; blade elliptic or ovate- or obovate-elliptic, very obtuse, subcucullate at the apex; claw half as long, linear-oblong. Stamens glabrous. Stamines 4 mm. long, oblanceolate-oblong in the upper half, obtuse, linear and pilose-ciliate in the lower half, with a gland behind the apex. Ovary glabrous, with 3 carpels bearing rotund processes. Style glabrous.

CAPE DIV.: summits of mountains near Simonstown, *MacOwan* 2550 (cotypes of *A. Wrightii* in Albany Mus., Bolus Herb. and S. Afr. Mus. Herb.), in Herb. Norm. Austr.-Afr. 555; top of Red Hill, *Compton* 17998, *Pillans* 2515, *Schlechter* 1088, *Walgate* 17; near Red Hill, Groot Kop, *Compton* 13256, *Walgate* 19; Zwartkop Range, *Pillans* 8987; near stream above Hester's Dam, *Galpin* 12771; Brightwater, *Compton* 14555; Platboom, *Compton* 13318; Vaco da Gama Peak, *Walgate* 18.

Flowering April—Oct. Sonder united this species with *A. rugosa* Link. Dümmer kept it distinct and stated that "Linne's type specimen is entirely in agreement with this plant." The present determination rests mainly on Dümmer's definite statement. The close similarity to forms of *A. rugosa* suggest a common origin and that the two species may be forms of one species.

83. *A. trichocarpa* *Holmes in Scottish Bot. Review* i, 162 (1912)!; *Dümmer in Fed. Rep.* xi, 420 (1912); *Holmes in Trans. and Proceedings Bot. Soc. Edinb.* xxvi, 77, t. 2 (1917).

A low shrub with pubescent or pilose branchlets. Leaves 4—5 mm. long, alternate, spreading or reflexed, slightly recurved, lanceolate, acute or subacute, rounded at the base, slightly concave above, pilose-ciliate, often with marginal stalked glands, with a prominent often pilose nerve beneath, with glands confined to the nerve and margin. Flowers in terminal clusters. Peduncles 5—6 mm. long, with stalked glands, bracteolate on the lower half. Sepals 1.5 mm. long, widely ovate, subacute, ciliolate, rounded and with stalked glands beneath. Petals 4 mm. long, glabrous; blade elliptic-oblong, very obtuse; claw scarcely half as long, linear. Stamens glabrous. Stamines 2.75—3 mm. long, lanceolate in the

upper half, tapering from the middle to the base, ciliate except near the base and apex, gland-tipped. Ovary with many stalked glands, with 3 carpels bearing oblong processes pilose at the apex. Style glabrous.

PIKETBERG DIV.: plateau on the Piketberg, *Schlechter* 5240 (cotypes in Albany Mus., Bolus Herb., Kew Herb. and S. Afr. Mus. Herb.).—TULBAGH DIV.: Neuwe Kloof, *Burchell* 989 partly.

Flowering June—Sept.

84. **A. abrupta** sp. nov.; ramulis pubescentibus; foliis alternatis ovato-lanceolatis subacutis, basin rotundatis vel subcordatis ciliatis, supra paulum concavis; floribus terminalibus; pedunculis glabris bracteolatis; sepalis oblongo-ovatis acutis ciliatis, margine membranaceo; petalis ovatis obtusis unguiculatis, basin ciliolatis; staminibus glabris; staminodis deltoideo-lanceolatis obtusis ciliatis, infra medium anguste linearibus, subtus pubescentibus, apice glandula notatis; ovario 2-loculari, apice pubescente, cornubus oblongis; stylo glabro.

A much branched shrublet. Branchlets pubescent, rough with small glands. Leaves 3—4 mm. long, alternate, spreading and slightly recurved, ovate-lanceolate, subacute, rounded or subcordate at the base, concave above or slightly concave up the middle, pilose-ciliate, with a row of glands at the margin and a few scattered beneath, with a scarcely raised nerve. Flowers in terminal clusters. Peduncles 3—4 mm. long, glabrous, with linear ciliate bracteoles on the lower half. Sepals 1 mm. long, oblong-ovate, obtuse, membranous at the margin, densely ciliate, obtusely keeled. Petals 3 mm. long; blade obovate, very obtuse; claw half as long, narrowly cuneate, ciliolate. Stamens glabrous. Staminodes 1.75 mm. long, deltoid-lanceolate and slightly concave in the upper half, obtuse; abruptly becoming very narrowly linear in the lower half, pubescent beneath and ciliate at the widest part, ciliolate immediately below the middle, with a distinctly terminal gland. Ovary pubescent on the upper half, with 2 carpels bearing oblong glabrous processes. Style glabrous.

CALEDON DIV.: near Gansbaai, Baviaansfontein, *Stokoe* 8282 (in Bolus Herb.).

Flowering Aug., Sept. The affinity is with *A. ciliaris* Druce from which it differs chiefly in the shape of the staminodes and the lesser number of carpels. The name is in allusion to the shape of the staminodes.

85. **A. marifolia** Eckl. and Zeyher, *Enum.* 113 (1835)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 422 (1860) incl. var.! **A. foliosa** *Sond. op. cit.* 421!; *Dümmer in Fed. Rep.* xi, 407 (1912) incl. var.! **Hartogia foliosa**, **H. marifolia** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets puberulous. Leaves 3·5—8 mm. long, alternate, much reflexed, ovate- or oblong-lanceolate, lanceolate-linear or linear-oblong, acute, rounded at the base, slightly convex, flat or slightly concave above, usually persistently hispidulous above and beneath, sometimes ciliate or with stalked glands, with a prominent nerve and scattered glands beneath. Flowers in terminal clusters. Peduncles 4 mm. long, shortly pubescent, bracteolate on the lower half. Sepals 1—1·5 mm. long, ovate, subacute or obtuse, rounded and pubescent beneath, sometimes shortly pubescent above or with 1 or 2 long apical hairs, rarely with stalked glands. Petals 4—4·5 mm. long, glabrous; blade elliptic- or obovate-oblong, obtuse; claw as long or almost so, narrowly linear. Stamens glabrous. Staminodes 2—3 mm. long, lanceolate or oblong-lanceolate, acuminate, gland-tipped, \pm pubescent above and sometimes beneath. Ovary glabrous, or pilose on the upper half, with 3 carpels bearing oblong hispid or pilose processes. Style glabrous.

CERES DIV.: Bokkeveld, *Marloth* 7791.—CLANWILLIAM DIV.: Heeren Logement, *Esterhuysen* 5565, *Compton* 10955; Klipfontein, *Ecklon and Zeyher* 887 (cotypes of *A. marifolia* in S. Afr. Mus. Herb. and Stockholm); between Olifants River and Knakisberg, *Zeyher* 296, *Drège* 7088 (cotypes of var. *lanceolata* in Kew Herb. and Stockholm); between Bergvlei and Langvlei, *Zeyher* 297 (type of *A. foliosa* in Stockholm, cotype in S. Afr. Mus. Herb.); Zeekoe Vlei, *Schlechter* 8510 (cotypes of var. *Schlechteri* in Bolus Herb. and National Herb.).—PIKETBERG DIV.: Piketberg, *Schlechter* 7903; Mouton's Vlei, *Edwards* 195; near Sauer, Bosch Kloof, *Penfold* 220.

Flowering June—Nov.

86. *A. elata* *Sond.* in *Harv. and Sond. Fl. Cap.* i, 438 (1860)! incl. var. *Hartogia elata* *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets glabrous, minutely and sparsely puberulous or pubescent. Leaves 3—4 mm. long, alternate, ascending, oblanceolate-oblong or oblanceolate, rarely oblong, obtuse, cuneate at the base, concave above, rounded and with inconspicuous glands beneath, glabrous, sometimes with small stalked glands on the margin. Flowers in terminal clusters, or the lower often axillary. Peduncles 6—7 mm. long, glabrous, puberulous or pubescent, with slender bracteoles on the lower half. Sepals 1—1·25 mm. long, ovate, obtuse, concave above, obtusely keeled beneath, glabrous or ciliate. Petals 3·5 mm. long, glabrous; blade obovate-elliptic, very obtuse, slightly concave above at the apex; claw $\frac{1}{2}$ as long, linear. Stamens glabrous. Staminodes 2·5 mm. long, linear-lanceolate, obtuse, with a gland behind the apex, tapering to a short oblong base, ciliate on the middle part. Ovary glabrous, with 3 carpels bearing rotund processes. Style glabrous.

South Africa: without precise locality, *Niven* (type of var. in Stockholm).—VAN RHYNSDORP DIV.: Giftberg, *Drège* 7115 (type in Stockholm, cotype in Kew Herb.).

Flowering Sept.—Nov.

87. **A. Foleyana** *Dümmer in Ann. Bol. Herb.* iii, 46 (1920)!

Branchlets puberulous. Leaves 3—5 mm. long, alternate, erect-spreading, elliptic, obovate- or ovate-elliptic, obtuse, rounded at the base, deeply concave above, pectinate-ciliate, rounded and with many glands scattered beneath, with a stout ciliate petiole. Flowers in terminal clusters. Peduncles 1.5 mm. long, stout, puberulous, with spathulate ciliate bracteoles at the middle. Sepals 3.5 mm. long, spathulate-oblong, very obtuse and incurved at the apex, submembranous, sparsely pubescent above, conspicuously ciliate, slightly convex beneath. Petals 6 mm. long; blade obovate, very obtuse; claw almost as long, linear, minutely ciliate. Stamens with sparsely pubescent filaments. Staminodes about 4.5 mm. long, long-adnate to the claws of the petals, linear-oblongate, obtuse, gland-tipped, tapering and ciliate in the lower half. Ovary strigose on the apex, with 3 carpels bearing small hump-like processes. Style glabrous.

CERES DIV.: Matroosberg, *A. Bolus* in Guthrie Herb. 4398; summit of the Matroosberg, *Compton* 8427; Laaken Vlei, *Phillips* 1964 (type, in S. Afr. Mus. Herb.); Roodeberg, *Stokoe* 8303.

Flowering Jan.

88. **A. cedrimontana** *Dümmer in Ann. Bolus Herb.* iii, 59 (1920)!

Branchlets glabrous. Leaves 2—3 mm. long, alternate, erect, subimbricate, narrowly ovate or narrowly obovate, obtuse, rounded at the base, concave and smooth above, pilose-ciliate, rounded and with scattered glands and minute pustules beneath. Flowers in terminal clusters. Peduncles 1.5—2 mm. long, glabrous, with 2 bracteoles on the upper half. Sepals 1.5—2 mm. long, ovate or oblong-lanceolate, obtuse, densely ciliate, rounded beneath. Petals 4—5 mm. long, glabrous; blade obovate- or oblong-elliptic, very obtuse; claw $\frac{2}{3}$ as long, linear. Stamens glabrous. Staminodes 2.5—3 mm. long, lanceolate, acuminate, oblong at the base, slightly concave above, pubescent beneath. Ovary pustulate, with 3 carpels bearing oblong smooth processes usually tipped with setiform hairs. Style glabrous. Fruit tubercled, often sparsely pilose on the upper half.

CERES DIV.: Southern Cederberg, Hondverbrand Ridge, east spur, *Esterhuysen* 12729; Cold Bokkeveld, "Rosendal," *Acocks* 5812.—CLANWILLIAM DIV.: Cederberg, *Pattison* in *Bolus* Herb. 15832 (type); Krommerivier, *Acocks* 3125, 3176, *Leighton* in *Bolus* Herb. 21589.

Flowering Sept.—Dec. There is a close affinity with *A. squamosa* Bartl. and Wendl. from which it differs by the leaves being narrower in proportion to the length, and by the claw of the petals being shorter than the blade.

89. *A. alticola* Schltr. ex Dümmer in Fed. Rep. xi, 324 (1912)!

Branchlets sparsely pubescent. Leaves 3·5—5·5 mm. long, alternate, subimbricate, obovate, obtuse, \pm concave and glabrous above, with raised glands and minutely setaceo-pubescent or glabrous beneath. Flowers in dense terminal clusters subtended by scarious leaves. Peduncles 1 mm. long, with bracteoles at the middle. Sepals 2·5 mm. long, elliptic or ovate-oblong, very obtuse, slightly concave and pubescent above, hyaline at the margin, with a slightly prominent hispid nerve beneath, gibbous and glandular behind the apex, ciliate. Petals 5 mm. long; blade obovate; claw slightly longer, slender, pilose on the lower half. Stamens glabrous. Staminodes adnate for a third of the length to the lower half of the petals, with a linear-oblong blade and slender pilose claw. Disk well developed, crenulate. Ovary with stalked glands on the upper half, with 3 carpels bearing rotund glabrous or sparsely setose processes. Style for the most part pilose.

CERES DIV.: Skurfsberg, near Wagenbooms River, *Schlechter* 10172 (type, in Kew Herb., cotypes in Albany Mus. and Bolus Herb.); Schoongezicht Peak, *Stokoe* 8308; Skilderberg, *Stokoe* 2655; between Matroosberg and Peak C., *Esterhuysen* 8301.—WORCESTER DIV.: Mostert's Hoek Twins, *Esterhuysen* 9815; Milner Peak, *Esterhuysen* 8720, 14262, 14908, 14947, 14959; Matroosberg, *Stokoe* 8296; Buffelhoek Peak, *Esterhuysen* 8403, 14842, 14851; Mt. Brodie, *Esterhuysen* 8435; Shale Peaks, *Esterhuysen* 8458, 8491, 8737; Fonteintjesberg, *Esterhuysen* 8766; Waaihoek Peak, south-east side, *Esterhuysen* 14840, 15122.

Flowering Dec., Jan. This species has a very close affinity with *A. alpina* Schltr.

90. *A. alpina* Schltr. in Journ. Bot. xxxvi, 25 (1898)!; Dümmer in Fed. Rep. xi, 416 (1912). *A. paludosa* Dümmer in Ann. Bolus Herb. iii, 61 (1920)!

Branchlets glabrous, puberulous or pilose. Leaves 3—8 mm. long, alternate, appressed, ascending or erect-spreading, sometimes imbricate, oblanceolate or obovate-oblong, elliptic-oblong, oblong or obovate, obtuse, rounded at the base, concave above, rounded and conspicuously gland-punctate beneath, at first pilose-ciliate and pilose beneath, usually becoming glabrous. Flowers in dense terminal clusters. Peduncles 1·25—3 mm. long, glabrous or sparsely pilose, with ovate or oblong bracteoles

on the lower half. Sepals 2—2.5 mm. long, elliptic, obovate- or rotund-elliptic, oblong or ovate, obtuse or subtruncate, concave and glabrous or pubescent above, sometimes hyaline at the margin or partly ciliate with hairs or stalked glands, sometimes slightly keeled and pubescent behind the apex. Petals 3.75—6 mm. long; blade obovate, very obtuse, glabrous; claw $\frac{1}{2}$ as long, slender, glabrous, or ciliate near the base. Stamens glabrous. Staminodes 3—3.75 mm. long, linear, linear-oblong or linear-obovate in the upper half, truncate or obtuse, tapering in the lower half, pilose at the middle, often with marginal stalked glands near the base, with a conspicuous gland behind the apex. Ovary tubercled, with 3 carpels bearing oblong or obovate pilose processes. Style for the most part pilose.

CERES DIV.: Matroosberg, near Laaken Vlei, *Phillips* 1963, 1967 (type of *A. paludosa*, in S. Afr. Mus.); Conical Peak, *Stokoe* 8296, 8298; Gydoonw, *Compton* 18735; Roodeberg, *Esterhuysen* 1497, *Leighton* 2204; Hottentots Kloof, mountain tops, *Pearson* 4930, 4932.—LAINSBURG DIV.: Witteberg, south slopes, *Compton* 2799, 21139; Witteberg, summit, *Compton* 3184, 12204.—WORCESTER DIV.: Matroosberg, *Marloth* 2259 (type of *A. alpina*, in National Herb., cotype in Bolus Herb.), 2259 a and b., *A. Bolus* in Guthrie Herb. 3966; Keeromsberg, *Esterhuysen* 9219; Bonteberg, Eikenbosch Hoek, *Esterhuysen* 3763.

Flowering Oct.—Dec.

91. **A. concava** sp. nov.; ramulis pubescentibus; foliis alternatis ovatis vel late ovatis subacutis vel obtusis, supra concavis glabris vel hispidulis, margine pilosis, subtus sparse pilosis; floribus terminalibus; pedunculis puberulis bracteolatis; sepalis oblongis obtusissimis ciliatis, subtus pubescentibus; petalis ovatis obtusis concavis unguiculatis; staminibus ad medium sparse pilosis; staminodis lineari-oblongis obtusis, basin versus attenuatis sparse pilosis, apice glandula notatis; ovario 3-loculari dense piloso, cornubus minutis; stylo sparse piloso.

Dwarf shrublet with rigid branches and long-pubescent branchlets. Leaves 3—5 mm. long, alternate, very crowded, erect-spreading, ovate, sometimes widely obovate, subacute or obtuse, concave, smooth and glabrous or minutely papillate and hispidulous above, pilose on the margin, with many scattered glands beneath and, at first, sparsely pilose, often persistently. Flowers in terminal clusters. Peduncles 1.25—1.5 mm. long, puberulous and with small stalked glands, with linear bracteoles at the apex or on the upper half. Sepals 2.5 mm. long, oblong, very obtuse, sparsely pubescent above, conspicuously ciliate, convex and pubescent beneath. Petals 5—5.5 mm. long; blade rather narrowly ovate, obtuse, concave, sometimes pilose beneath; claw $\frac{1}{2}$ — $\frac{2}{3}$ as long,

linear. Stamens with filaments sparsely pilose at the middle. Staminodes 4—4.5 mm. long, $\frac{2}{3}$ adnate to the claw of the petals, linear and very sparsely pilose at the base, with a linear-oblong blade tapering to an obtuse gland-tipped apex. Disk very prominent, splitting into 5 lobes. Ovary densely pilose, with 3 carpels bearing minute rotund processes hidden by hairs. Style sparsely pilose except towards the apex.

WORCESTER DIV.: Hex River Mts., Buffelshoek Peak, *Esterhuysen* 8409 (type, in Bolus Herb.); Buffelshoek Twins, *Esterhuysen* 8391; Shale Peaks, *Esterhuysen* 8492; Milner Ridge Peak, *Esterhuysen* 8739, 14257, 14870.

Flowering Dec. The affinity is with *A. alticola*, differing with the leaves not constantly obovate and the petals having an ovate blade. The name is in allusion to the concave petals.

92. *A. stilbeoides* Dümmer in *Ann. Bolus Herb.* iii, 45 (1920)! *A. lycopodioides* Bartl. and Wendl. var. *trichostyla* Dümmer in *Fed. Rep.* xi, 404 (1912)!

Branchlets pubescent. Leaves 2.75—4.5 mm. long, alternate, crowded, erect-spreading, ovate, rarely lanceolate-ovate, obtuse, subacute or acute, rounded at the base, slightly incurved at the apex, concave and sparsely puberulous or glabrous above, ciliate, ecarinate, \pm scabrid pubescent and with prominent glands beneath. Flowers in terminal clusters. Peduncles 0.5—0.75 mm. long, puberulous, with narrowly oblanceolate puberulous bracteoles on the upper half, subtended by oblanceolate ciliate bracts. Sepals 2.5 mm. long, spatulate or obovate-oblong, obtuse, concave and glabrous above, ciliate, ecarinate, glandular and pubescent beneath on the upper half. Petals 5—7 mm. long; blade obovate or rotund, sparsely pubescent above on the lower part, with a gland behind the apex; claw $1\frac{1}{2}$ —2 times as long, narrowly linear, sparsely pilose above. Stamens glabrous. Staminodes about 3.25 mm. long, partly adnate to the petals, slender, subspathulate at the apex, pilose on the slender free portion. Disk divided at the margin into 5 transversely oblong lobes. Ovary puberulous, with 1 carpel without any evident process. Style pilose.

CLANWILLIAM DIV.: Cederberg, *Stokoe* 8305; Sneeuwkop, summit, *Leipoldt* 650 (type of *A. stilbeoides* in S. Afr. Mus. Herb., cotypes in Albany Mus. and Bolus Herb.), *Compton* 6248, *Pocock* 198; peak south of Sneeuwkop, *Esterhuysen* 7586; Sneeuwberg, *Esterhuysen* 13847; Krakadouwberg, *Esterhuysen* 7501, 12105, 14319; Wolfberg, *Esterhuysen* 13811; without precise locality, *Wallich* in Kew Herb. (type of *A. lycopodioides* var. *trichostyla*).

Flowering Oct.—March.

93. *A. adnata* sp. nov.; ramulis villosis; foliis alternatis ovato- vel oblongo-lanceolatis vel ellipticis obtusis, supra concavis, margine saepe pubescentibus, subtus convexis pilosis vel villosis; floribus terminalibus; pedunculis pubescentibus bracteolatis; sepalis lineari-oblongis obtusissimis ciliatis, supra pubescentibus; petalis ellipticis vel obovatis, infra medium unguiculatis pilosis; staminibus glabris; staminodis linearibus, infra medium unguiculatis, basin versus adnatis; ovario 2—3-loculari pubescente piloso ecornuto; stylo piloso.

A much branched shrublet usually 20—30 cm. high with villous branchlets. Leaves 3—5 mm. long, alternate, crowded, erect-spreading, ovate- or oblong-lanceolate, elliptic or rarely obovate, obtuse, concave and sometimes minutely papillate above, often pubescent on the margin, rounded beneath, with conspicuous scattered glands, amply pilose or villous. Flowers in terminal clusters. Peduncles 1.5—3 mm. long, puberulous or pubescent, often with minute stalked glands, bearing linear pubescent bracteoles on the upper half. Sepals 1.5—2.5 mm. long, linear-oblong, very obtuse, slightly concave and sparsely pubescent above and beneath, long-ciliate. Petals 4—5 mm. long; blade elliptic or narrowly obovate, obtuse, glabrous; claw $1\frac{1}{2}$ times as long, filiform, pilose. Stamens glabrous. Staminodes $\frac{2}{3}$ — $\frac{3}{4}$ as long as the petals and adnate to the lower half, with a linear blade and a filiform ciliate claw. Disk clasping the ovary. Ovary pubescent and pilose, with 2 or rarely 3 laterally compressed carpels without processes. Style pilose. Fruit bearing small conical processes on the dorsal angle of the cocci.

CERES DIV.: Cederberg, Sandfontein Peak, *Esterhuysen* 13874; Gideon's Kop, *Esterhuysen* 13896.—CLANWILLIAM DIV.: Cederberg, *Stokoe* 8304; Langberg, *Esterhuysen* 7329; Sphinx, *Esterhuysen* 7587 (type, in Bolus Herb.); peak north of Tafelberg, *Esterhuysen* 14322.

Flowering Nov.—Jan. The affinity is with *A. humilis* Sond. from which it differs mostly with bracteoles on the upper half of the peduncle, with very obtuse more hairy sepals, and with carpels without processes. The name alludes to the adnate staminodes.

94. *A. humilis* Sond. in *Harv. and Sond. Fl. Cap.* i, 407 (1860)! Var. *capitata* Dümmer in *Ann. Bolus Herb.* iii, 45 (1920)! *Hartogia humilis* O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets pubescent. Leaves 5—6 mm. long, alternate, erect-spreading, lanceolate or ovate-lanceolate, acute or obtuse, rounded at the base, concave and glabrous or sparsely pilose above, rounded tuberculate-scabrid and pilose beneath, becoming glabrous. Flowers in terminal clusters. Peduncles 1—2 mm. long, puberulous, with linear ciliate bracteoles on the lower half. Sepals 2—2.25 mm. long, lanceolate, oblong-

lanceolate, oblong, lanceolate- or oblanceolate-oblong, obtuse or subacute, concave and glabrous above, hyaline and ciliate at the margin, obtusely keeled and glabrous or sparsely setose beneath. Petals 5—5.5 mm. long; blade elliptic-oblong, obtuse, glabrous; claw as long, filiform sparsely ciliate. Stamens glabrous. Staminodes 4—4.5 mm. long, linear-oblong in the upper half, obtuse, filiform ciliate and adnate to the petals in the lower half. Ovary pubescent on the apex, with 2 carpels bearing very small rounded processes. Style pilose.

CLANWILLIAM DIV.: Blaauwberg, *Drège* 7098 (type, in Stockholm); Cederberg, Grootberg, *Leipoldt* 893 (type of var. *capitata* in S. Afr. Mus. Herb., cotype in Bolus Herb.); Northern Cederberg, ridge on plain at Boontjeskloof, *Esterhuysen* 12211; below peak at Koupoort, *Esterhuysen* 12146.

Flowering Oct.—Dec.

95. *A. conferta* sp. nov.: ramulis hispidis; foliis alternatis subimbricatis obovatis obtusis vel subacutis, basin obtusissimis, supra paulum concavis sparse hispidulis; floribus terminalibus; pedunculis sparse hispidulis ebracteolatis; sepalis lanceolatis obtusis ciliatis, subtus hispidulis; petalis obovatis unguiculatis glabris; staminibus glabris; staminodis spatulatis, infra medium filiformibus sparse pubescentibus; ovario 5-loculari tuberculato, cornubus late obovatis; stylo pubescente.

Branchlets hispid. Leaves 5—6 mm. long, alternate, subimbricate, erect-spreading, obovate, often widely so, obtuse or subacute, rounded at the base, slightly concave and often sparsely hispidulous above, with gland-swelling and small stalked glands at the margin, convex, hispid and conspicuously nerved beneath. Flowers in dense terminal clusters. Peduncles 2.5—3 mm. long, sparsely hispidulous, ebracteolate. Sepals 2.5 mm. long, lanceolate or oblong-lanceolate, obtuse, concave above, densely ciliate, sometimes with stalked glands on the margin, conspicuously thickened behind the apex. Petals 6 mm. long, glabrous; blade obovate, very obtuse; claw $1\frac{1}{2}$ —2 times as long, filiform. Stamens glabrous. Staminodes 3.5 mm. long, spatulate, sparsely pubescent on the filiform lower half. Disk with 5 widely deltoid very obtuse lobes. Ovary with 5 carpels tubercled at the apex and bearing widely obovate hispid processes. Style pubescent except at the apex.

CLANWILLIAM DIV.: Northern Cederberg, Krakadouwsberg, near summit, *Esterhuysen* 14318 (type, in Bolus Herb.), 15004.

Flowering Dec. A distinct species without any evident affinity. The name alludes to the crowding of the leaves.

96. *A. Peglerae* Dümmer in. *Fed. Rep.* xi, 325 (1912)! *A. mixta*

Dümmer op. cit. 329, incl. var. **albaniensis!** **A. Bunburyana** *Dümmer op. cit.* 419.

Branchlets glabrous or hispidulous. Leaves 0.6—1.4 cm. long, alternate, crowded, ascending or erect-spreading, linear, obtuse or subacute, cuneate at the base, concave above, rounded or obtusely keeled and with scattered glands beneath, sometimes slightly swollen behind the apex, glabrous, or rarely pilose beneath. Flowers in terminal clusters. Peduncles 4—6 mm. long, glabrous, with lanceolate bracteoles on the lower half. Sepals 2.25—2.5 mm. long, lanceolate, obtuse, ciliate, with a keel extending down to the peduncle. Petals 5—6.5 mm. long; blade ovate, elliptic, elliptic-obovate or elliptic-oblong, obtuse or subacute, tapering at the base, concave at the apex, sparsely pilose above; claw half to almost as long, narrowly linear, pilose. Stamens pilose on the lower half of the filaments. Staminodes 5—6 mm. long, narrowly linear, tipped with a gland, filiform towards the base, pilose except towards the apex. Ovary glabrous, with 3 carpels bearing rotund processes. Style glabrous.

ALBANY DIV.: near Grahamstown, [*Bunbury* (type of *A. Bunburyana* in Brit. Mus.), not seen] Britten 5168, Galpin 326, Schönland 283, MacOwan 176 (type of var. *albaniensis* in Bolus Herb.), 1045, Bolus 10624, Glass in S. Afr. Mus. Herb. 30731; Featherstone Kloof, Rennie 207; Mountain Drive, Dyer 2283.—BATHURST DIV.: between Theopolis and Port Alfred, Burchell 3974; Glenfilling, Drège 7097 partly (type of *A. mixta* in Kew Herb.).—EAST LONDON DIV.: Golf Course, Rattray 1260.—KENTANI DIV.: coast belt, Pegler 795 (type of *A. Peglerae* in Bolus Herb.).

Flowering Oct.—Febr. The affinity is very close to *A. gonaquensis* from which it probably is best distinguished by the difference in the shape and relative lengths of the parts of the petals.

97. **A. gonaquensis** Eckl. and Zeyher, *Enum.* 110 (1835)!; Bartl. in *Linnaea* xvii, 375 (1843); Sond. in *Harv. and Sond. Fl. Cap.* i, 411 (1860); *Dümmer in Fed. Rep.* xi, 328 (1912). **Hartogia gonaquensis** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets shortly pubescent or glabrous. Leaves 6—9 mm. long, alternate, crowded, ascending, linear, obtuse, rounded at the base, concave above, rounded or obtusely keeled and with minute glands beneath, distinctly gibbous behind the apex, glabrous, or sometimes at first pilose beneath. Flowers in terminal clusters. Peduncles 3—4 mm. long, sparsely pilose on the lower half, with linear ciliate bracteoles at or below the middle. Sepals 2—2.5 mm. long, linear-lanceolate, obtuse, pilose-ciliate, with a keel extending down to the apex of the peduncle. Petals 5—6 mm. long; blade obovate, obtuse, concave above in the upper half,

often with a few long hairs on the lower half; claw twice or almost twice as long, filiform, pilose except at the base. Stamens pilose on the middle part of the filaments. Staminodes 5—6 mm. long, narrowly linear in the upper half, filiform in the lower half, tipped with a rotund gland, pilose on the middle part. Ovary pilose on the apex, with 3 carpels bearing rotund glabrous processes. Style glabrous.

PORT ELIZABETH DIV.: Algoa Bay, *Cooper* 1462; *Koega*, *Zeyher* 2165; Kavis River, *Drège* 7110; Baakens River Valley, *I. L. Drège* 365, *Long* 208; Schoenmakers Kop, *Paterson* 572; New Brighton, *Galpin* 6423; Theescomb, *Paterson* 481, 572; 12 miles along the Cape Road, *Long* 548; Vaal Vlei Estate, *Mogg* 4742; between Port Elizabeth and Witte Klip, *Rodin* 1018.—UITENHAGE DIV.: flats between Krakamma and Van Stadens, *Zeyher* 962, *Ecklon and Zeyher* 864 (cotypes in Kew Herb., Lund, National Herb. and S. Afr. Mus. Herb.); Redhouse, *Paterson* 2274.

Flowering Jan.—Dec.

98. **A. Hookeri** *Sond. in Harv. and Sond. Fl. Cap.* i, 406 (1860)!; *Walgate in Fl. Cape Peninsula* 540 (1950). **Hartogia Hookeri** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets coarsely pubescent or pilose. Leaves 0·8—1 cm. long, alternate, ascending and imbricate, or erect-spreading, linear or lanceolate-linear, obtuse, rounded at the base, usually slightly incurved, concave and glabrous above, strongly involute at the margin, rounded, \pm pilose and with impressed glands beneath, or only pilose on the margin, sometimes minutely tuberculate-scabrid. Flowers in terminal clusters surrounded by many widened leaves with scarious margins. Peduncles 1·5—3 mm. long, with long narrowly linear ciliate bracteoles on the upper half. Sepals 4·5 mm. long, linear, subacute, slightly widened in the upper half, slightly concave above, ciliate, sparsely pilose beneath. Petals 5—9 mm. long, glabrous; blade elliptic-oblong, obtuse, concave above, tapering into a slender claw 3 times as long. Stamens glabrous. Staminodes 5·5 mm. long, linear-oblong and pilose on the upper half, tapering to an acute reflexed apex, narrowly linear in the lower half. Ovary pubescent on the apex, with 3 carpels bearing small rounded processes. Style pubescent at the base.

CAPE DIV.: hills near Simonstown, *Hooker* (type, in Kew Herb.); *Compton* 17559, *W. Dod* 2058; *Faroe Kop*, *Walgate* 1; *Slangkop*, *Lamb.* 1283; Table Mt. above Llandudno, *Esterhuysen* 14128; Smitswinkel Bay, *Esterhuysen* 7981; Bonteberg, *Esterhuysen* 7982, *Compton* 9368; Rooi-hoogte, *Compton* 13783; Paul's Berg, *Barker* 4306; *Patrys and Smitswinkel vleis*, *W. Dod* 1503, *Pillans* 8979; near Sirkels Vlei, *Compton*

16338, *Salter* 2850; Cape Point, *Compton* 18293.—CALEDON DIV.: near Palmiet River Mouth, *Gillett* 4247, *Levy* 7777; near Palmiet River, foothills of Platteberg, *Stokoe* in *Bolus* Herb. 33942; Hanglip, *Compton* 13579.

Flowering Aug.—Nov. Plants which have not been burnt at some time are rarely seen. They are sparingly branched, the branches being usually decumbent, and the leaves have hairs only on the margins. Leaves on plants which have produced branches after being burnt down to the level of the ground are covered with hairs on the lower face.

99. ***A. squamosa*** *Bartl. and Wendl. Diosm.* 141 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 418 (1860); *Dümmer in Fed. Rep.* xi, 403 (1912). ***Diosma squamosa*** *Willd. ex Roem. and Schultes, Syst. Veg.* v, 462 (1819); *Spreng. Syst. Veg.* i, 787 (1825). ***Hartogia squamosa*** *O. Kze. Rev. Gen.* i, 102 (1891).

Branchlets glabrous. Leaves 1·5—2 mm. long, alternate, ascending, subimbricate, obovate or rotund, obtuse, rounded at the base, deeply concave and smooth above, pilose-ciliate, rounded and with raised glands beneath, with a petiole ciliate on the decurrent base. Flowers in terminal clusters. Peduncles about 1 mm. long, glabrous, with bracteoles on the upper half. Sepals 1·5 mm. long, obovate, obtuse, rounded and with a few glands beneath, ciliate. Petals 5 mm. long, glabrous; blade elliptic, obtuse; claw almost twice as long, linear. Stamens glabrous. Staminodes 2·5 mm. long, fusiform, concave above, pubescent beneath at the margin, with an apical gland. Ovary tubercled, with 3 carpels bearing oblong obtuse processes pilose at the apex. Style glabrous. Fruit coarsely tubercled.

CERES DIV.: hills east side of Karoo Poort, *Acocks* 1666, *Levy* 4626, *Esterhuysen* 2577, *Barker* 3018, *Marloth* 9069; between Bokkeveld Sneeuw-kop and Winklehaaks River, "Zuurvlakte," rocky ridge, *Esterhuysen* 12681.—WORCESTER DIV.: hills near Touws River *Bolus* 7358.

Flowering June—Sept.

100. ***A. hispida*** *Bartl. and Wendl. Diosm.* 132 (1824) excl. syn. *Linn. et Murr.*; *Sond. in Harv. and Sond. Fl. Cap.* i, 429 (1860) excl. syn. *Linn. et Murr.* ***Diosma hispida*** *Thunb. Prodr.* 42 (1794)!; *ej. Diss. Diosm.* 4 (1797); *Willd. Sp. Pl.* i, 1135 (1798) excl. syn. *Linn. et Murr.*; *Pers. Syn. Pl.* i, 247 (1805) excl. syn.; *DC. Prodr.* i, 716 (1824) excl. syn. *Linn.* ***Bucco hispida*** *Roem. and Schultes, Syst. Veg.* v, 446 (1819) excl. syn. *Linn. et Murr.* ***Agathosma trachyphylla*** *Eckl. and Zeyher, Enum.* 110 (1835)!

Branchlets pubescent. Leaves mostly 0·6—1·2 cm. long, alternate,

crowded, erect-spreading, linear or oblong, acute, subacute or obtuse, rounded or cuneate at the base, concave above, obtusely keeled beneath, persistently hispid throughout, with 4 rows of glands beneath. Flowers in terminal clusters. Peduncles 4 mm. long, puberulous, with slender bracteoles on the lower half. Sepals 1.25—1.5 mm. long, ovate-lanceolate, obtuse, convex and puberulous beneath. Petals 5 mm. long, glabrous; blade oblong-obovate; claw $1\frac{1}{2}$ times as long, slender. Stamens glabrous. Staminodes 1.5 mm. long, linear-oblong, attenuate, gland-tipped, tapering towards the base, concave above, shortly ciliate. Ovary pilose on the apex, with 3 carpels bearing oblong pilose processes. Style glabrous.

MALMESBURY DIV.: Zwartland and Paardeberg, *Ecklon and Zeyher* 865 (cotypes of *A. trachyphylla* in S. Afr. Mus. and Stockholm); Paardeberg, east slopes, *Pillans* 6317, 7657.—PAARL DIV.: Paarl Mt., *Drège* 7099, *Henderson* 1192; near Paarl, *Burchell* 755.—PIKETBERG DIV.: between Piketberg and Verlooren Vlei, *Thunberg* (cotype of *A. hispida* in Stockholm).

Flowering June—Oct. The affinity is with *A. bisulca* B. and W., from which it differs chiefly in the shape of the petals.

101. ***A. capitata*** *Sond. in Harv. and Sond. Fl. Cap.* i, 434 (1860)! ***Hartogia capitata*** *O. Kze. Rev. Gen.* i, 101 (1891). ***A. capituliformis*** *Dümmer in Fed. Rep.* xi, 327 (1912)! excl. var.

Branchlets glabrous. Leaves 3.5—5 mm. long, alternate, ascending, slightly incurved towards the apex, subimbricate, lanceolate, subacute, shortly cuneate at the base, concave and glabrous above, pilose-ciliate, conspicuously keeled and with scattered glands beneath, tubercled and pilose on the keel. Flowers in terminal clusters. Peduncles 1—2 mm. long, glabrous, with bracteoles at or near the apex. Calyx glabrous. Sepals 2.5 mm. long, oblong-lanceolate, obtuse, concave above, obtusely keeled beneath. Petals 4—6 mm. long; blade obovate, obtuse; claw $1\frac{1}{2}$ times or almost twice as long, filiform, glabrous, or sparsely pilose on the lower half. Stamens glabrous. Staminodes 2.75—3.25 mm. long, linear, tapering towards both ends, pilose at the middle. Ovary pilose on the apex, with 3 carpels bearing linear-oblong pilose processes. Style glabrous. Fruit with reticulate ridges.

PIKETBERG DIV.: Piketberg, by water courses, *Drège* (type of *A. capitata* in Stockholm, cotypes in Kew Herb. and National Herb.); plateau on the Piketberg, *Schlechter* 5238 (cotypes of *A. capituliformis* in Albany Mus., Bolus Herb., Kew Herb. and S. Afr. Mus. Herb.).

Flowering Sept.—Nov. E. Meyer identified material of this species in *Drège's* Herbarium as being "*A. erecta*," but it is distinct from *A. erecta* Bartl and Wendl.

102. **A. collina** Eckl. and Zeyher, *Enum.* 110 (1835)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 407 (1860); *Dümmer in Fed. Rep.* xi, 324 (1912). **A. graveolens** Meissn. in *Flora* xxvii, 302 (1844)! **Hartogia collina** O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets with spreading pubescence. Leaves 3.5—5 mm. long, alternate, ascending, subimbricate, slightly incurved, ovate-lanceolate, subacute, rounded at the base, concave and scabridous above, obtusely keeled, with many raised glands beneath, tipped with a rigid hair, yellow-green. Flowers in terminal clusters. Peduncles 1.5—2.5 mm. long, sparsely puberulous, with large bracteoles at or near the apex. Sepals 2—2.5 mm. long, oblong-ovate or ovate-lanceolate, obtuse, membranous at the margin, ciliate, keeled on the upper half. Petals 4.5 mm. long; blade ovate or rotund, villous above on the lower half; claw $1\frac{1}{2}$ times as long, linear, villous. Stamens with very sparsely pilose filaments. Staminodes 3.5 mm. long, adnate to the lower part of the petals, linear, villous, with a large terminal gland. Ovary glabrous, with 3 carpels bearing clavate processes. Style glabrous.

South Africa: without precise locality, *Thorn* 481, 831.—BREDASDORP DIV.: Cape Agulhas, *Schlechter* 10553, *Esterhuysen* 7625, *Pillans* 8177; "Brandfontein," among dunes near the shore, *Smith* 4968; Struys Bay, *Salter* 4102, *Levy's* 3538, *Walgate* in Natal Herb. 37245; Marcus Bay, "Wagenhuis Kraal," *Fry* in Galpin Herb. 4952.—CALEDON DIV.: mountain slopes near Genadendal, *F. Krauss* 1447 (cotype of *A. graveolens* in Stockholm) [It is very doubtful whether the plant was collected in this locality].—SWELLENDAM DIV.: hills near Swellendam, *Mund* in Ecklon and Zeyher Herb. 860 (cotypes of *A. collina* in S. Afr. Mus. and Stockholm) [There is some doubt as to the correctness of this locality].

Flowering April—Dec.

103. **A. capensis** *Dümmer in Fed. Rep.* xi, 421 (1912); *Druce in Rep. Bot. Exch. Club. Brit. Isles* 1913, iii, 413; *Walgate in Fl. Cape Peninsula* 542 (1950). **Hartogia capensis** *Linn. Syst. Nat.* ed. 10, ii, 939 (1759) [non *Linn. Sp. Pl.* ed. 2, ii, 288 (1762)]. **Diosma brevifolia** *Lam. Encycl. Meth.* iii, 285 (1786). **D. ciliata** *Thunb. Prodr.* 43 (1794); *ej. Diss. Diosm.* 11 (1797); *Willd. Sp. Pl.* i, 1135 (1798) excl. syn. *Berg. et Linn.; Pers. Syn. Pl.* 247 (1805); *Roem. and Schultes, Syst. Veg.* v, 459 (1819) excl. syn. *Linn.; Thunb. Fl. Cap. ed. Schultes* 225 (1823). **D. capensis** *Ait. Hort. Kew.* iii, 488 (1789); *Murr. Syst. Veg.* ed. 15, p. 250 (1797) excl. syn. *Linn. Bucco erecta* *Wendl. Collect.* i, 17, t. 3 (1805); *Roem. and Schultes, Syst. Veg.* v, 441. **Bucco brevifolia** *Roem. and Schultes, Syst. Veg.* v, 446. **Diosma thyoides** *Willd. ex Roem. and Schultes, Syst. Veg.* v, 462. **D. erecta** *DC. Prodr.* i, 715 (1824). **Agathosma erecta** *Bartl. and Wendl.*

Diosm. 135 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 434 (1860); *Engl. in Engl. and Prantl, Pflanzenfam.* iii, §14, p. 151 (1896). **A. Thunbergiana** Bartl. and Wendl. *Diosm.* 150. **A. patula** G. F. W. Mey. in Bartl. and Wendl. *Diosm.* 124. **Diosma Thunbergiana** Spreng. *Syst. Veg.* i, 786 (1825). **Agathosma ericoides** Schldl. in *Linnaea* vi, 206 (1831); *Sond. in Harv. and Sond. Fl. Cap.* i, 431; *Dümmer in Fed. Rep.* xi, 420. **A. fastigiata** Eckl. and Zeyher, *Enum.* 117 (1835)!; *Sond. op. cit.* 436. **A. platy-petala** Eckl. and Zeyher, *Enum.* 116!; *Dümmer in Fed. Rep.* xi, 410 incl. var. *glabricalyx*. **A. chortophila** Eckl. and Zeyher, *Enum.* 116!; *Bartl. in Linnaea* xvii, 367 (1843); *Sonder op. cit.* 435; *Dümmer op. cit.* 421. **A. cyminoides** Eckl. and Zeyher, *Enum.* 117!; *Bartl. op. cit.* 368. **A. nigra** Eckl. and Zeyher, *Enum.* 117!; *Bartl. op. cit.* 366; *Sond. op. cit.* 436. **A. geminifolia** Eckl. and Zeyher, *Enum.* 115!. **A. decumbens** Eckl. and Zeyher, *Enum.* 116!; *Sond. op. cit.* 91. **A. Gillivrayi** *Sond. op. cit.* 437!; *Walgate in Fl. Cape Peninsula* 542. **A. hirtella** *Sond. op. cit.* 430!. **A. tenuis** *Sond. op. cit.* 423!. **A. glabrata** var. *Eckloniana* *Sond. op. cit.* 437!. **A. Thunbergiana** *Sond. op. cit.* 425. **A. variabilis** *Sond. op. cit.* 433; *Dümmer in Fed. Rep.* xi, 420. **A. juniperina** *Sond. op. cit.* 433!. **A. Owanii** *Harv. and Sond. in Harv. Thes. Cap.* ii, 42, t. 165 (1863); *Dümmer op. cit.* 422. **Hartogia chortophylla**, **H. decumbens**, **H. erecta**, **H. ericoides**, **H. fastigiata**, **H. Gillivrayi**, **H. hirtella**, **H. juniperina**, **H. nigra**, **H. patula**, **H. platy-petala**, **H. Thunbergiana** *O. Kze. Rev. Gen. Pl.* i, 101 (1891). **H. tenuis**, *O. Kze. op. cit.* 102. **Agathosma lactea** Schltr. in *Engl. Bot. Jahrb.* xxvii, 161 (1900)!. **A. muizenbergensis** *Dümmer op. cit.* 409!; *Walgate in Fl. Cape Peninsula* 541. **A. gustrowensis** *Dümmer op. cit.* 406!. **A. neglecta** *Dümmer op. cit.* 422!. **A. delicatula** *Compton in Trans. Roy. Soc. S. Afr* xix, 297 (1931)!.

A shrublet varying considerably in height. Branchlets glabrous, puberulous, pubescent or pilose, sometimes with stalked glands. Leaves 1.5—7 mm. long, alternate, erect-spreading or suberect, ovate, oblong-ovate, oblong, lanceolate, linear-lanceolate, lanceolate-linear or linear, acute, subacute, obtuse or rounded at the apex, rounded at the base, often incurved at the apex, \pm concave above, convex and \pm keeled beneath, sometimes dorsally compressed, glabrous, ciliate, pilose on the margin and keel, puberulous, pilose or hispid above and beneath or only beneath, sometimes with conspicuous or small, sometimes stalked, glands beneath. Flowers in terminal clusters, or the lower axillary. Peduncles mostly 3—6 mm. long, puberulous, pubescent, pilose or, less often, glabrous, rarely with stalked glands, with bracteoles on the lower half. Sepals 1—2.5 mm. long, ovate, deltoid-ovate, lanceolate or ovate-lanceolate, acute, subacute or obtuse, keeled on the upper half, sometimes membranous at the margin, glabrous or \pm pubescent beneath, \pm ciliate,

rarely with stalked glands. Petals 3—5 mm. long; blade rotund, obovate-rotund, elliptic, obovate or obovate-elliptic, obtuse, sometimes pubescent above the nerve; claw scarcely half as long to equal in length, linear or narrowly so, glabrous or ciliate. Stamens glabrous. Staminodes 1.25—4 mm. long, linear, linear-lanceolate, lanceolate or lanceolate-oblong, attenuate, gland-tipped, cuneate or linear at the base, concave and \pm pubescent above at the middle, \pm ciliate. Ovary glabrous, or pilose at the apex, with 3 or sometimes 2 carpels having oblong or obovate pilose or glabrous processes. Style glabrous or pilose at the base.

South Africa: without precise locality, *Drège* 7105, *Harvey* 549, *Thom* 330, 548.—ALBANY DIV.: near Grahamstown, *MacOwan* (type of *A. Owanii* in Trin. Coll. Dublin); Highlands, *Daly and Sole* 328; Hills near Salem, *Bennie* 737.—ALEXANDRIA DIV.: between Port Elizabeth and Grahamstown, *Story* 1304; near De Kol, *Grant* 14; near Sandflats, *Burt-Davy* 14257.—BATHURST DIV.: near mouth of Great Fish River, *MacOwan* 343.—BREDASDORP DIV.: Koude Rivier, *Schlechter* 9615 (cotypes of *A. lactea* in Albany Mus., Bolus Herb., Kew and National Herb.).—CALEDON DIV.: Hermanus, *Rogers* 26594; Caledon, *Lamb* 2198; hills between the Zwartberg and Kleinriviersberg, *Ecklon and Zeyher* 917 (cotypes of *A. nigra* in Kew, National Herb., S. Afr. Mus. Herb. and Stockholm); Grabouw, *Bolus* 4118; Zwartberg, *Guthrie* 2479; Aries Kraal, *Compton* 16473; Klein River Mts., *Stokoe* 8283; Frikkiesbaai, *Leighton* 1911; between Villiersdorp and French Hoek, *Bolus* 5140.—CALVINIA DIV.: between Nieuwoudtville and Oorlogs Kloof, *Leipoldt* 3719.—CAPE DIV.: Phisante Kraal, *Compton* 16922, *Levy* in Bolus Herb. 23968; Durbanville, *Levy* 2519; between Paarden Island, Blaauwberg and Tigerberg, *Drège* 7111 (type of *A. tenuis* in Stockholm), *Lewis* in S. Afr. Mus. Herb. 53058; Tigerberg, *Pillans* 4756; Devil's Peak, *Bolus* 3856; Kasteels Poort, *Forbes* 108; above Camp's Bay, *MacOwan* 2708, in Herb. Norm. Austr-Afra. 554, *Letty* 175, *Galpin* 3875, *Penfold* 156, *Esterhuysen* 12284, 14127, *Walgate* 53; Lion's Head, *W. Dod* 3135, *Froembling* 93; Llandudno, *Compton* 14820; Hout Bay Nek, *Hutchinson* 101; Little Lion's Head, *Walgate* 52; Hout Bay, *Barker* 3286, *Walgate* 51; between Hout Bay and Chapman's Peak, *Pillans* 9981; west slopes of Chapman's Peak, *Compton* 9359, *Esterhuysen* 7985; Silvermine Valley, *Walgate* 34; between Constantiaberg and Noordhoek Peak, *Walgate* 33; Constantiaberg, *Pillans* 8984; Cape Flats near Rondebosch, *Lamb* 127; Doornhoogte, *W. Dod* 3622; Kenilworth, sandy flats, *Bolus* 7942; Tokai, sandy flats, *Levy* 5257, *Guthrie* 874; Muizenberg, *Bolus* 4633, 4647, 4648; Kalk Bay Mt., *Barker* 4204; Dassenberg, *Walgate* 41; Kommetjie, *Barker* 650, *Galpin* 3877; Clovelly, *Compton* 13359, *Walgate* 37, 44, 273; Scarborough and Witsands, *Walgate* 45, *Esterhuysen* 12953; Slangkop,

Esterhuysen 7984, *W. Dod* 1569; "Simon's Bay," *MacGillivray* 630 (type of *A. Gillivrayi* in Stockholm, cotype in Kew); mountains near Simons-town, *Compton* 18026, *Schlechter* 1070, *W. Dod* 1832, 2059; Klaasjagersberg, *Compton* 17567, *Leighton* 1493; Klaver Vlei, *W. Dod* 2057; Zwartkop Range, *Walgate* 40, 43; Klaasjager Farm, *Salter* 6390; Theeberg, *Walgate* 33; Bonteberg, *Compton* 9367, *Esterhuysen* 7983; Rooihoochte, *Compton* 13782, *Walgate* 56; Smitswinkel, *Compton* 10631, 18830, *Leighton* in *Bolus Herb.* 23975, *Walgate* 59; near Cirkels Vlei, *Compton* 16329, *Leighton* 1508; hills west of Buffels Bay, *Pillans* 4624; Tuin Kop, *Walgate* 55; Vasco da Gama Peak, *Walgate* 32; Cape Point, *Compton* 18292, 20238.—CERES DIV.: near Ceres, *Bolus* 8394; east base of the Witzenberg, *Leighton* 1326, *Pillans* 9631; Gydouw, *Compton* 18717, 18749, *Leipoldt* 3714, 3716; west base of the Schurfdeberg, *Esterhuysen* 14731, *Pillans* 9597, 9665, 9678; Schurfdeberg Pass, *Compton* 16802, 16811; Witzenberg, summit, *Andrae* 143; Olifants River Mts., south of Groen, *Esterhuysen* 13471; Witzenberg Vlake, *Compton* 21018; Michell's Pass, *Bolus* 23995, *Esterhuysen* 14161, *Schlechter* 8955; Michell's Peak, *Esterhuysen* 14750; 7 miles west of Gydouw, *Hutchinson* 1037; Southern Cold Bokkeveld, *Compton* 12496, *Levy's* 1952; Tafelberg, *Esterhuysen* 3921, *Bond* 693; ridges near Winkelhaaks River, *Esterhuysen* 12686; Laken Vlei, *Levy's* 1042, *Phillips* 1961; Zwart Ruggens, *Levy's* 1881; Karoo Poort, *Leipoldt* 3717; Mostert's Hoek Twins, *Wasserfall* 804, *Esterhuysen* 9904.—CLANWILLIAM DIV.: without precise locality, *Mader* 178; Kardouw (type of *A. hirtella* in Stockholm, cotype in S. Afr. Mus.); The Baths, *Stephens* in *Sladen Mem. Exped.* 7737; east slopes of Grassruggens, *Pillans* 8721; near Wupperthal, Honig Vlei, *Leipoldt* 646; Cederberg, *Stokoe* 8280, *Thode* A1973, A1974, A1976; Langberg, *Esterhuysen* 7358; near Sneeuwkop, *Esterhuysen* 7557; Langkloof, *Shaw* in *Bolus Herb.* 5607; between Citrusdal and Elands Kloof, *Stokoe* 8284, *Barker* 3777; Grootberg, *Esterhuysen* 4152; Pakhuis, *Barker* 783, *Bolus* 8960, *Esterhuysen* 7394, *Bond* 617, *Compton* 12694, *Galpin* 11079; Middelberg, *Compton* 12732, *Esterhuysen* 7178; Giftberg, *Compton* 20790; Elands Kloof, *Compton* 9703, 20966, *Esterhuysen* 3127, *Henderson* 2216, between Groot Rivier and Elands Kloof, *Leipoldt* 3713; Grey's Pass, *Schlechter* 4955; Twenty Four Rivers Mts., north side, *Esterhuysen* 16089; Cold Bokkeveld Mts., west slopes, *Esterhuysen* 15318.—GEORGE DIV.: Langkloof, Keurbooms River, *Fourcade* 5235; hills west of Keurbooms River, *Fourcade* 3369; Montagu Pass, *Schulchter* 5797; hills north of Gans Kraal, *Fourcade* 3402.—HUMANSDORP DIV.: between Ziefontein and Joubert's Kraal, Kouga, *Fourcade* 3112, 3121; Kouga Mts., *Esterhuysen* 10794; flats north of Humansdorp, *Schönland* 3031, 3026; near the coast at Slang Bay, *Keet* 892; Zitzikama, Diep River, *Fourcade* 775; Essen-

bosch, *Fourcade* 4422; between Humansdorp and Riet Vlei, *Fourcade* 5659; between Kromme River and Palmiet Vlei, *Fourcade* 5376; Zuurborn, *Fourcade* 3981; Loerie Plantation, *Dix* 79; hills at Essensbosch, *Fourcade* 4419.—LADISMITH DIV.: Roodeberg, *Compton* 3854; Seven Weeks Poort, *Phillips* 1417; near Ladismith, *Levy's* 4204, 8970, 8982, *Esterhuysen* 13999.—MALMESBURY DIV.: Moorreesburg, *Esterhuysen* 3127; between Bokbaai and Darling, *Esterhuysen* 7630; hills at Mamre, *Compton* 13882; Riebeeck Kasteel, near summit, *Pillans* 6094; Kalabas Kraal, *Salter* 4936.—MONTAGU DIV.: Montagu, *Compton* 18432; near the Koo, Eendracht Pass, *Levy's* 7959; Rabiesberg, *Compton* 5790; Baden Hills, *Compton* 18432; between Montagu and Triangle, *Michell* 176; Keur Kloof, *Compton* 5786, *Lewis* in Bolus Herb. 23930; Eendracht, *Compton* 18379; Dobbelaars Kloof, *Walgate* in Bolus Herb. 23423.—MOSSEL BAY DIV.: near Mossel Bay, Driefontein, *Drège* 7094.—OUDTSHOORN DIV.: Zwartberg Pass, *Bolus* 11461, 11462, *Luttig* in Marloth Herb. 11420, *Esterhuysen* 4540, 8952, *Hafstrom and Acocks* 783, *Stokoe* 9291; near Robinson's Pass, Moeras River Drift, *Bolus* 23931, *Hops* 97; Krevasberg, summit, *Stokoe* 8495.—PAARL DIV.: French Hoek, *Bolus* 5140, *Schlechter* 9271, 9293, 9328; Wemmershoek Mts., *Bond* 729, *Esterhuysen* 4099, 11234; French Hoek Pass, *Compton* 8166; Paarl Mt., *Drège* 7106, 7106a partly; Groot Drakenstein, *Rogers* 17989; Drakenstein Mts., Devil's Tooth, *Esterhuysen* 9533; west entrance to Du Toit's Kloof, *Pillans* 8396, 8397, 8398, 8428; Hercules Pillar, *Compton* 13659, *Pillans* 9996, *Salter* 5718, *Esterhuysen* 16014.—PIKETBERG DIV.: Piketberg, *Schlechter* 5211; plateau on the Piketberg, *Pillans* 7382; Zebra Kop, *Pillans* 7504; Mouton's Vlei, *Pillans* 7171; near "Goedverwacht," *Bolus* 8424; hills near Porterville, *Schlechter* 10719; Saron, *L. Bolus* in Bolus Herb. 16290, *Levy's* 5673; "The Rest," *Gillett* 3744.—PORT ELIZABETH DIV.: near Port Elizabeth, *Kemsley* 96, *Long* 205, *Trash* 8, 9; near Parkin's Vlei, *Holland* 3745; Burchell's Valley, *Kensit* in Bolus Herb. 6377; Walmer, *Paterson* 2373; Aloes, *I. L. Drège* 3022; Redhouse, *Paterson* 1131.—PRINCE ALBERT DIV.: between Prince Albert and Klaarstrom, "Eiker Kraal," *Leipoldt* in Bolus Herb. 23979.—RIVERSDALE DIV.: Garcia's Pass, *Burchell* 7022, *Bolus* 11241, *Schlechter* 1732; Albertinia, *Rogers* 16702, *Salter* 6910; Oude Tuin, *Muir* 1775; hills near Riversdale, *Muir* 2404, 3244, 4456.—STELLENBOSCH DIV.: Kraaifontein, *Compton* 4848; sandy flats north of Kanonberg, Brakenfel, *Acocks* 2282; Gordon's Bay, *Bolus* 9932 (type of *A. gustrowensis* in Bolus Herb.); Sir Lowry's Pass, *Schlechter* 1134, *Barker* 1730, *Compton* 13496, *Parker* 4146, 4290, 4357.—SWELLENDAM DIV.: Swellendam, *Ecklon and Zeyher* 916 (cotypes of *A. cymnoides* in Lund, S. Afr. Mus. Herb. and Stockholm).—TULBAGH DIV.: Tulbagh, *L. Bolus* in Bolus Herb. 14019; Winterhoek, *Bolus*

5326, *Ecklon and Zeyher* 915 (cotypes of *A. platypetala* in S. Afr. Mus. and Stockholm), *Stokoe* 8278; near Tulbagh Waterfall, *Bolus* 5315, *Drège* 7107, *Ecklon and Zeyher* 911, 914 (cotypes of *A. chortophila* in Lund, National Herb., S. Afr. Mus. and Stockholm), *Lamb* 2196, *Hutchinson* 404; Roodesand Berg, *Compton* 6561, 6562; Great Winterhoek, *Drège* 7102 (type of *A. juniperina* in Stockholm, cotype in Kew Herb.); Ontongsborg, *Isaac* in *Bolus* Herb. 23977.—UITENHAGE, DIV.: Van Staadens, *Paterson* 170, 811, 2345, *Galpin* 3869, *Ecklon* 203, *Ecklon and Zeyher* 901 (cotype of *A. geminifolia* in S. Afr. Mus. Herb.), *Drège* 7109; between Krakakama and Van Staadens, *Ecklon and Zeyher* 905 (cotypes of *A. ericoides* in S. Afr. Mus. and Stockholm); near Coega River, *Grasrug*, *Ecklon and Zeyher* 912 (cotypes of *A. decumbens* in Kew Herb., National Herb., S. Afr. Mus. Herb. and Stockholm); Bethelsdorp, *Paterson* 171; Winterhoek, *Fries*, *Norlindh and Weimarck* 1180.—UNIONDALE DIV.: hills at Uniondale, *Esterhuysen* 16412; Joubertina, *Esterhuysen* 6854, 10626, 13641, 16373; Kouga Mts., *Esterhuysen* 10794; Haarlem, *Burchell* 5023, *Schönland* 3102; Long Kloof, *Ecklon and Zeyher* 918 (cotypes of *A. fastigiata* in S. Afr. Mus. Herb. and Stockholm); mountains near Avontuur, *Marloth* 10943; headwaters of Wagenbooms River, *Fourcade* 2387; Mannetjiesberg, *Esterhuysen* 6430, 6489; Hoopsberg, *Esterhuysen* 6586; Misgund Hills, *Esterhuysen* 6945; Slypsteenberg, *Esterhuysen* 6307; Kamanasieberg, *Bolus* 2281, *Esterhuysen* 16446.—WILLOWMORE DIV.: Aasvogelberg, summit, *Marloth* 14159; Blydeberg, *Andreae* 941.—WORCESTER DIV.: Du Toit's Kloof, *Drège* 7108, *Esterhuysen* 9699a; north entrance to Du Toit's Kloof, *Barker* 4823; Bain's Kloof, *Compton* 8136, *Schlechter* 9128, 9199; Slanghoek Mt., *Wasserfall* 620; Bailey's Peak, *Esterhuysen* 1615, 8279, 8519; Witte River Valley, *Esterhuysen* in *Bolus* Herb. 23978; between Seven Sisters and Krom River Dome, Zuurvlaakte, *Esterhuysen* 12321; Wilde Paardeberg, *Stokoe* 2523; Roman's River, *Leighton* 2187; Waaihoek Mts., *Esterhuysen* 8292, 14838; Keeromsberg, *Esterhuysen* 9181, 9185; Hex River, *Tyson* 657; north-east slope of Prospect Peak, *Esterhuysen* 15903, 15925; Kavadoews Mts., *Esterhuysen* 10314, 10920; Bonteberg, Eikenbosch Hoek, *Esterhuysen* 3648, *Compton* 3764, 9926; Tweedside Mt., *Marloth* 10823; Witteberg, *Compton* 2694, 3324, 5910, 5911, 7958, 12125, 12163, 13955, 15208, 21124, *Leighton* 207.

Flowering Jan.—Dec. Probably the most widely distributed and most polymorphic species. Extreme forms differ so greatly in superficial appearance that they seem to be quite distinct species, but they are all connected by intermediate forms, and they possess certain characters common to all. Varietal groups cannot be maintained. In the north and north-east areas of distribution the leaves are mostly shorter, relatively wider, more compressed dorsally, more obtuse and more often

puberulous than in other forms, and the sepals are mostly shorter and more obtuse. In the eastern areas the leaves are narrower and relatively longer, the sepals more tapering and the glands smaller than in other forms. The form confined to the sandy flats in the extreme south-west connects the south coast form with the inland forms. A reduction in the number of carpels from 3 to 2 occurs in most plants of the south coast form and sometimes in the eastern form. Precise knowledge of the identity of Linne's *Hartogia capensis* is not available for present use, but it seems certain, from his description and Dümmer's definite statement, made after seeing the Linnean Collection, in regard to its identity, that the typical form is included in the above description.

104. **A. glabrata** Bartl. and Wendl. *Diosm.* 165 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 437 (1860) excl. var. *Eckloniana*; Dümmer in *Fed. Rep.* xi, 423 (1912) incl. var. *paradoxa*; Walgate in *Fl. Cape Peninsula* 541 (1950). **A. thyoides** G. Don, *Gen. Syst.* i, 787 (1831). **A. erecta** var. **glaberrima** Schldl. in *Linnaea* vi, 204 (1831)! **Hartogia glabrata** O. Kze. *Rev. Gen.* i, 101 (1891). **Agathosma multicaulis** Dümmer l. c.!

Branchlets glabrous, hispidulous or rarely pubescent. Leaves 3·5—7 mm. long, alternate, ascending, lanceolate or ovate-lanceolate, obtuse and navicular at the apex, rounded at the base, concave above, rounded and sometimes nerve-keeled beneath, with scattered glands, glabrous, ciliate at the base or with a few hairs above on the lower half. Flowers in terminal clusters. Peduncles 0·7—1·2 cm. long, glabrous, hispidulous or pubescent, with bracteoles on the lower half. Sepals 1·5—2 mm. long, ovate or ovate-lanceolate, obtuse or subacute, obtusely keeled, ciliate, sometimes sparsely pubescent beneath on the lower half, or pubescent above. Petals 3—4·5 mm. long; blade obovate or rotund; claw as long or almost so, narrowly linear or subfiliform, glabrous or ciliate. Stamens glabrous. Stamines 2—3·5 mm. long, oblanceolate- or linear-oblong, obtuse, with a gland behind the apex, tapering and ciliate towards the base. Ovary glabrous, with 2 or rarely 3 carpels bearing rotund processes. Style glabrous.

CAPE DIV.: Duikervlei and Doornhoogte, *Ecklon and Zeyher* 909 partly, 910; Cape Flats, *Niven* (cotype of *A. multicaulis* in Kew Herb.), *Zeyher* 298 partly; near Vygerkraal, *W. Dod* 1867, *Pillans* 1906, 2134; Rondebosch Flats, *Bolus* 7003; Claremont Flats, *Guthrie* 657; Retreat, "Bergvleit," *Burchell* 248, *Walgate* 60, *Zeyher* 1169; hills near Simons-town, *Schlechter* 1073.—MALMESBURY DIV.: Hopefield, *Bolus* 12638 (type of var. *paradoxa* in Bolus Herb.).

Flowering July—Dec.

105. **A. corymbosa** G. Don, *Gen. Syst.* i, 789 (1831). **Diosma corym-**

bosa Montin in *Phys. Sallsk. Handl.* i, 106 (1776). **D. pubescens** Thunb. *Prodr.* 43 (1794); *ej. Diss. Diosm.* 18 (1797) excl. syn. omn.; *Willd. Sp. Pl.* i, 1138 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Thunb. Fl. Cap. ed. Schultes* 225 (1823). **D. hirta** Vent. *Malm. t.* 72 (1803) excl. syn. Lam.; *Ait. Hort. Kew ed.* 2, ii, 30 (1811); *Poir. Encycl. Meth. Suppl.* ii, 484 (1812); *Ker-Gawl. in Edwards' Bot. Reg. t.* 369 (1819); *Lam. Illus. t.* 127, f. 3 (1823); *Lodd. Bot. Cab.* 1122 (1826). **Bucco villosa** Wendl. *Collect.* i, 14, t. 2 (1805); *Roem. and Schultes, Syst. Veg.* v, 438 (1819). **Agathosma villosa** Willd. *Enum. Hort. Berol.* 259 (1809); *Link, Enum. Hort. Berol.* i, 238 (1821); *Bartl. and Wendl. Diosm.* 163 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 426 (1860); *Wildeman, Hort. Then.* t. 4 (1899); *Dümmer in Fed. Rep.* xi, 412 (1912). **Bucco Ventenatiana** Roem. and Schultes, *Syst. Veg.* v, 442 (1819). **Agathosma Ventenatiana** Bartl. and Wendl. *Diosm.* 161 (1824). **A. laxa** Bartl. and Wendl. *Diosm.* 162. **Diosma rugosa** Hort. Angl. ex Bartl. and Wendl. *Diosm.* 162. **D. purpurea**, **D. rubra** Hort. ex Bartl. and Wendl. *Diosm.* 163. **D. Wendlandiana** DC. *Prodr.* i, 715 (1824). **Agathosma pubescens** G. Don, *Gen. Syst.* i, 788 (1831). **Hartogia villosa**, **H. Ventenatiana** O. Kze. *Rev. Gen.* i, 102 (1891).

A low shrub with pubescent branchlets. Leaves 4—7 mm. long, alternate, ascending or erect-spreading, lanceolate, obtuse or subacute, often laterally compressed at the apex, rounded at the base, slightly incurved towards the apex, concave and glabrous above, obtusely keeled and \pm pubescent or pilose beneath, sometimes only on the keel and margin. Flowers in terminal clusters. Peduncles mostly 5—6 mm. long, villous, usually purple, with bracteoles on the lower half. Sepals 2.5—3 mm. long, lanceolate or ovate-lanceolate, subacute, sparsely pubescent above, obtusely keeled and \pm pubescent or villous beneath, rarely glabrous, conspicuously membranous at the margin. Petals 4—5 mm. long; blade obovate, rounded at the apex, sometimes with a few hairs above; claw almost as long, narrowly linear, glabrous. Stamens glabrous. Staminodes 3.5—4.5 mm. long, linear, obtuse, with a gland behind the apex, tapering towards the base, villous shortly below the middle. Ovary glabrous, with 2 carpels bearing oblong processes. Style glabrous.

CAPE DIV.: without precise locality, *Cooper* 2152; between Paarden Eiland, Blaauwberg and Tigerberg, *Drège* 7090; Lion's Rump, above Green Point, *Drège* 9093; Duiker Vlei and Doornhoogte, *Ecklon and Zeyher* 907; near Cape Town, *Zeyher* 298 partly; sandy flats near Bellville, *MacOwan* 2750, in Herb. Norm. Austr-Afr. 711; Cape Flats, *Bolus* 4422, *Marloth* 476, *Salter* in *Bolus Herb.* 23993; flats east of Blaauwberg, *Compton* 15864, 18114, *Leighton* 564, 1755; flats at south base of the Tigerberg, *Levy* 2026, *Pillans* 4765; Doornhoogte, *W. Dod.* 1865.—MALMESBURY DIV.: 3 miles east of Mamre Road Station, *Hutchinson*

206, *Salter* 6868, *Walgate* 48, flats south of Mamre, *Thorne* in S. Afr. Mus. Herb. 53121.

Flowering May—Oct. The conspicuous membranous margins of the sepals serve to distinguish this species from all allies.

106. **A. microcalyx** *Dümmer in Fed. Rep.* xi, 418 (1912)!

Branchlets puberulous. Leaves 3—6 mm. long, alternate, erect-spreading or spreading, slightly recurved, linear, usually slightly widened in the upper half, obtuse, rounded at the base, slightly concave above, \pm gland-crenate, obtusely keeled and bisulcate beneath, entirely hispidulous. Flowers in terminal clusters, or the lower often axillary. Peduncles 4—5 mm. long, hispidulous, with bracteoles at or shortly below the middle. Sepals 0.75 mm. long, deltoid-ovate, subacute or obtuse, rounded and hispidulous beneath. Petals 3.5—3.75 mm. long, glabrous; blade rotund-ovate, very obtuse; claw $1\frac{1}{2}$ — $1\frac{3}{4}$ times as long, very slender. Stamens glabrous. Staminodes 1.75 mm. long, lanceolate, gland-tipped, cuneate at the base, pubescent above. Ovary glabrous, with 3 carpels bearing subquadrate retuse processes. Style glabrous.

CALVINIA DIV.: Bokkeveld, *Leipoldt* 855; between Nieuwoudtville and Oorlogs Kloof, *Leipoldt* 3718.—CLANWILLIAM DIV.: Blaauwberg, *Schlechter* 8436 (cotypes in Albany Mus., Bolus Herb., Kew Herb., National Herb. and Stockholm); Pakhuis Mt., *Schlechter* 10795.

Flowering Aug., Sept. The affinity is with *A. bisulca*, from which it is distinguished by shorter and more spreading leaves and by the lanceolate staminodes.

107. **A. bisulca** *Bartl. and Wendl. f. Diosm.* 129 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 429 (1860); *Dümmer in Fed. Rep.* xi, 412 (1912). **Diosma bisulca** *Thunb. Prodr.* 84 (1794); *ej. Diss. Diosm.* 8 (1797); [**D. bifurca** (error typograph.) *Willd. Sp. Pl.* i, 1136 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Roem. and Schultes, Syst. Veg.* v. 454 (1819); *Thunb. Fl. Cap. ed. Schultes* 222 (1823); *Spreng. Syst. Veg.* i, 786 (1825). **Agathosma glauca** *Eckl. and Zeyher, Enum.* 112 (1835)!. **A. barosmaefolia** *Eckl. and Zeyher, Enum.* 111!; *Bartl. in Linnaea* xvii, 378 (1843); *Sond. op. cit.* 427; *Dümmer op. cit.* 412 incl. var. *angustifolia*. **A. acerosa** *Eckl. and Zeyher, Enum.* 114!; *Sond. op. cit.* 428; *Dümmer op. cit.* 412. **A. Leipoldtii** *Dümmer op. cit.* 416! **Hartogia acerosa**, **H. barosmifolia**, **H. bisulca** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets puberulous or rarely glabrous. Leaves mostly 1—2.5 cm. long, alternate, erect-spreading, linear, oblanceolate-linear or oblanceolate-oblong or acerosa, acute, tapering at the base, concave above, rounded-convex or slightly keeled beneath, often bisulcate beneath,

glabrous or puberulous above and beneath, sometimes with hairs at the apex, with scattered glands beneath. Flowers in terminal clusters or the lower axillary, often in small axillary racemes associated in panicles. Peduncles 5—8 mm. long, puberulous or glabrous, with two bracteoles on the lower half. Sepals 1.5 mm. long, ovate, acute to very obtuse, obtusely keeled beneath on the upper half, membranous at the margin, puberulous or glabrous, sometimes ciliate. Petals 5—6 mm. long; blade widely ovate, elliptic or rotund, obtuse, sometimes sparsely pubescent above and beneath at the middle; claw as long to twice as long, subfiliform, sometimes pubescent near the base. Stamens glabrous. Staminodes about 3.5 mm. long, oblanceolate in the upper half and very slender in the lower half, or linear, obtuse and usually slightly retuse, \pm pubescent or villous above, with a gland behind the apex. Ovary glabrous, or hispidulous on the upper half, with 2, 3 or rarely 4 carpels bearing rotund glabrous or pubescent processes. Style glabrous or sparsely pubescent. Fruit studded with glands.

CALVINIA DIV.: Nieuwoudtville, *Leipoldt* 877, in Bolus Herb. 9392 (type of *A. Leipoldtii*, cotype in Kew Herb.).—CERES DIV.: east slopes of Olifants River Mts., south of Groen, *Esterhuysen* 13404.—CLANWILLIAM DIV.: flats near Herculesfontein, *Ecklon and Zeyher* 892 (cotypes of *A. acerosa* in Kew Herb., Lund and National Herb.), *Zeyher* 1074; Zeekoe Vlei, *Compton* 11016, *Schlechter* 8492, 8497 (cotypes of var. *angustifolia* in Albany Mus., Bolus Herb. and National Herb.), *Esterhuysen* 5618, *Pillans* 7072, *Gillett* 4061, *Leipoldt* 4317, 4318; hills between Witte Els Kloof and Lambert's Hoek Berg, *Pillans* 9044; Clanwillaim, *Mader* 237; between Graafwater and Clanwilliam, *Lamb* 3566; Olifants River Mts., *Schlechter* 5110; Olifants River Valley, *Leipoldt* in Bolus Herb. 23991; Alpha, *Bond* 1088; Nieuwoudt Pass, *Compton* 5396; "Brakfontein," *Ecklon and Zeyher* 874 (cotypes of *A. barosmaefolia* in Kew Herb., National Herb., S. Afr. Mus. Herb. and Stockholm), *Schlechter* 7978; Giftberg, *Compton* 20805, 20831, *Phillips* in Sladen Mem. Exped. 7533; Pakhuis Pass, *Galpin* 11079, *Leipoldt* in Bolus Herb. 23983; Algeria Forest Station, *Galpin* 10579, *Levyns* 2225, 3003; Uitkomst, *Compton* 6796; Uitkyk, *Compton* 4796, 4806; Nardouw, *Compton* 6993, *Salter* 7538; Cederberg, *Primos* in Marloth Herb. 11688; Sneeuwberg, Duivelsgat, *Esterhuysen* 13139; Middelberg, *Esterhuysen* 7283; Bosch Kloof, *Pocock* 701; Wupperthal, *Leipoldt* 854; "Vogelfontein," *Levyns* 1142; "Kransvlei," *L. Bolus* in Bolus Herb. 23755; between Kromme Rivier and Bergvlei, *Drège* 7100 (type of var. *glabra* in Stockholm); Elands Kloof, *Hafstrom and Acocks* 774; between Bergvlei and Langvlei, *Acocks* 2902; Bergvlei, *Zeyher* 1180, *Ecklon and Zeyher* 875 (cotypes of *A. glauca* in S. Afr. Mus. and Stockholm).—MALMESBURY DIV.: hills near Darling, *Schlechter* 5332;

Hopefield, *Bachmann* 456, *Pattison* in Bolus Herb. 13902, *L. Bolus* in Bolus Herb. 16291, 20932, 20933; Saldanha Bay, *Levy's* 3223.—PIKETBERG DIV.: Piketberg, *Bolus* 7540, 23984, *Guthrie* 2567; near west entrance to Grey's Pass, *Howe* 171; St. Helena Bay, granite hills, *Marloth* 8097; Mouton's Vlei, *Pillans* 7220, 7329, 7330; Paleisheuvel, *Barker* 4787; Sauer, *Barker* 2657.

Flowering July—Dec. The leaves vary in shape with the various soil and climatic conditions of the sandy flats and the foothills of the Cederberg. The wide-leaved form, *A. barosmaefolia*, usually having only 2 carpels, is confined to the inland parts of the Clanwilliam Division.

108. *A. giftbergensis* *Phillips* in *Ann. S. Afr. Mus.* ix, 116 (1913)!

A. rotundipetala *Phillips* *op. cit.* 117!

Branchlets puberulous. Leaves 4—7 mm. long, alternate, erect-spreading or spreading, linear or linear-lanceolate, obtuse, subacute or acute, sometimes apiculate or tipped with a hair, rounded at the base, \pm concave above, rounded and with scattered glands beneath, glabrous or puberulous, or sparsely ciliate at the base. Flowers in terminal clusters. Peduncles about 5 mm. long, glabrous or hispidulous, with bracteoles on the lower half. Sepals 0.75—1 mm. long, ovate or subrotund, obtuse or subacute, rounded beneath, glabrous or ciliate. Petals 3.5—4.5 mm. long; blade elliptic, obovate, obovate-oblong or rotund, very obtuse, glabrous, or pubescent beneath on the nerve; claw from half to equal in length, linear, glabrous or sparsely ciliate. Stamens glabrous. Staminodes 1.5—2 mm. long, linear, lanceolate-linear or linear-lanceolate, gland-tipped, cuneate at the base, concave above, pubescent above and beneath. Ovary glabrous, or sparsely pubescent on the apex, with 3 carpels bearing oblong obtuse processes. Style glabrous.

CLANWILLIAM DIV.: Pakhuis, *Compton* 6857, *Schlechter* 10806, *Esterhuysen* 3129, 3130, 3131, *Pillans* 7088, *Thorne* in *S. Afr. Mus. Herb.* 52695; between Pakhuis and Wupperthal, Bidouw River, Diamond Drift, *Leipoldt* 3715; top of Nieuwoudt Pass, *Acocks* 776, *Esterhuysen* 8132, *Leighton* in Bolus Herb. 21587, *Weintraub* in Bolus Herb. 19484; top of Krakadouw Poort, *Esterhuysen* 12254; top of Uitkyk Pass, Kriedouw Krantz, *Gillett* 4116; Boontjes River, *Leipoldt* in Bolus Herb. 19092.—VAN RHYNSDORP DIV.: Giftberg, *Phillips* in *Sladen Mem. Exped.* 7536 (type of *A. giftbergensis* in *S. Afr. Mus. Herb.*, cotypes in Albany Mus., Bolus Herb. and National Herb.), 7537 (type of *A. rotundipetala* in *S. Afr. Mus. Herb.*).

Flowering July—Sept.

109. *A. crassifolia* *Sond. in Harv. and Sond. Fl. Cap.* i, 438 (1860)!

A. glabrata E. Mey. ex C. Muell. in Walp. Ann. vii, 513 (1869) absque descr. **Hartogia crassifolia** O. Kze. Rev. Gen. i, 101 (1891).

Branchlets glabrous or sparsely pubescent. Leaves 2—8 mm. long, alternate, erect-spreading, linear, oblong or elliptic-oblong, very obtuse, rounded at the base, rather fleshy, glabrous, narrowly or rarely widely concave above, sometimes with small stalked glands on the margin, rounded and with many scattered impressed glands beneath, with a stout petiole long-decurrent below the articulation. Flowers in terminal clusters. Peduncles 3 mm. long, glabrous, with bracteoles on the lower half. Sepals 1.25—1.5 mm. long, ovate, obtuse, glabrous, submembranous and often toothed at the margin, rounded-convex beneath. Petals 4—6 mm. long; blade elliptic-oblong; claw as long or almost so, slender, ciliate near the base. Stamens glabrous. Staminodes 3—4.5 mm. long, linear, tapering to a truncate apex and to the base, pilose at or shortly below the middle. Ovary glabrous, with 3 carpels bearing oblong processes. Style glabrous.

South Africa: without precise locality, Drège 7117.—CERES DIV.: Karoo Poort, Acocks 779, Esterhuysen 5491, Walgate 503, Levyns 4619, Compton 5560, 8912.—CLANWILLIAM DIV.: Krakadouw, Pocock 551; Matjesrivier, Wagener 271.—LADISMITH DIV.: Seven Weeks Poort Compton 7416, Levyns 2433.—LAINGSBURG DIV.: Witteberg, Compton 7984, 16291; Pieter Meintjes, Rogers 16316.—WORCESTER DIV.: Hex River Pass, Drège (type of *A. crassifolia* in Stockholm, (cotype in Kew Herb.); De Doorns, Bolus 13082; Orchard Siding, Rogers 16596.

Flowering June—Nov. The type of *A. glabrata*, collected by Drège, is in the Riks. Mus., Stockholm.

110. **A. sedifolia** Schldl. in *Linnaea* vi, 206 (1830)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 438 (1860). **Hartogia sedifolia** O. Kze. Rev. Gen. i, 102 (1891).

A low shrub with glabrous branchlets. Leaves 6—8 mm. long, alternate, ascending, subimbricate, linear-oblong, sometimes lanceolate-oblong, obtuse, rounded at the base, navicular, obtusely keeled, pilose on the margin and keel. Flowers in terminal clusters. Peduncles 6 mm. long, glabrous, with slender bracteoles near the base. Sepals 3 mm. long, ovate, acute, keeled, thickened at the apex, membranous at the margin, villous-ciliate. Petals 6 mm. long; blade obovate, cucullate at the apex; claw $\frac{1}{2}$ as long, cuneate, pubescent above. Stamens glabrous. Staminodes 3.5 mm. long, linear, attenuate, recurved at the apex, furrowed above, pubescent on the lower half, with a large apical gland. Ovary pilose on the apex, with 3 carpels bearing obovate pilose processes.

BREDASDORP DIV.: hills near Zoutendals Vlei, Miss H. Joubert in

Ecklon and Zeyher's Herb. 862 (cotypes in Kew Herb., S. Afr. Mus. Herb. and Stockholm).

111. **A. lancifolia** *Eckl. and Zeyher, Enum.* 109 (1835)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 428 (1860). **Hartogia lancifolia** *O. Kze. Rev. Gen.* i, 101 (1891). **Agathosma pusilla** *Dümmer in Fed. Rep.* xi, 414 (1912)!

Branchlets puberulous. Leaves 0.5—1.3 cm. long, alternate, ascending, lanceolate, subulate-acute or almost so, widely cuneate at the base, concave, scabridous and usually minutely puberulous above, pilose-ciliate, distinctly keeled beneath, often pubescent or pilose on the keel, scabridous and usually minutely puberulous, with impressed scattered glands. Flowers in terminal clusters, or the lower axillary. Peduncles 2.5 mm. long, glabrous, with long slender ciliate bracteoles near the base. Sepals 3—3.5 mm. long, oblong-lanceolate, subacute, concave above, ciliate, rounded beneath, obtusely keeled on the upper half. Petals 6—7 mm. long, glabrous; blade narrowly obovate, obovate or rotund-obovate; claw $2\frac{1}{2}$ —3 times as long, filiform. Stamens glabrous. Staminodes 4—5 mm. long, narrowly linear, often subspathulate at the apex, villous on the lower half, with a large gland behind the apex. Disk with acuminate lobes 1—1.5 mm. long. Ovary pilose on the apex, with 3 carpels bearing ovate pilose processes. Style sparsely hispid or glabrous.

CLANWILLIAM DIV.: hills near the Olifants River, *Ecklon and Zeyher* 857 (cotypes of *A. lancifolia* in S. Afr. Mus. Herb. and Stockholm).—TULBAGH DIV.: hills near TULBAGH KLOOF, *Bolus* 8422.

Flowering Oct. This species is unique in having a disk with acuminate lobes. The type of *A. pusilla* is in Kew Herbarium. It is a small specimen mounted next to the type of *A. mixta*, Drège 7097 from Bathurst Division, and is without information about the locality or collector, though Dümmer records it as "*Drège* 7097 partly."

112. **A. Joubertiana** *Schldl. in Linnaea* vi, 207 (1830); *Sond. in Harv. and Sond. Fl. Cap.* i, 430 (1860). **Hartogia Joubertiana** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets pubescent. Leaves 5—8 mm. long, alternate, ascending, subimbricate, linear-lanceolate, acute, rounded at the base, slightly incurved towards the apex, concave and glabrous above, pilose-ciliate, convex and obtusely keeled beneath, slightly thickened behind the apex, pilose on the keel, with glands almost confined to the keel and margin. Flowers in terminal clusters. Peduncles 6—7 mm. long, puberulous, with slender hair-tipped bracteoles on the lower half. Sepals 1.5—1.75 mm. long, lanceolate, subacute, obtusely keeled, glabrous. Petals

4.5 mm. long, glabrous; blade narrowly obovate; claw $\frac{2}{3}$ as long, linear. Stamens glabrous. Stamines 1.5 mm. long, linear-oblancoale, attenuate, gland-tipped, tapering towards the base, ciliate at the middle. Ovary pilose-setose on the apex, with 3 carpels bearing rounded processes. Style glabrous.

BREDASDORP DIV.: coast belt near Zoutendalsvlei, *Miss H. Joubert* (Ecklon and Zeyher 868, cotypes in Kew Herb., S. Afr. Mus. Herb. and Stockholm).

This has a close affinity with *A. sedifolia* of which it may be a form.

113. **A. florulenta** *Sond. in Harv. and Sond. Fl. Cap. i, 437 (1860)!*
Hartogia florulenta *O. Kze. Rev. Gen. i, 101 (1891).*

Branchlets hispidulous. Leaves 4—6 mm. long, alternate, ascending, subimbricate, lanceolate-oblong, obtuse, tapering shortly at the base, concave and smooth above, slightly swollen behind the apex, with rigid cilia based on marginal glands, obtusely keeled beneath, with glands mostly on the keel. Flowers in terminal clusters. Peduncles 4—5 mm. long, puberulous, with slender bracteoles about the middle. Sepals 1 mm. long, lanceolate, obtuse, obtusely keeled, glabrous. Petals 4 mm. long; blade obovate-oblong, very obtuse; claw half as long, linear, ciliolate. Stamens glabrous. Stamines 2.5 mm. long, oblong-linear, obtuse, slightly widened and shortly ciliate in the lower half, tapering towards the base. Ovary glabrous, with 3 carpels bearing oblong obtuse processes. Style glabrous.

BREDASDORP DIV.: Zoutendals Vlei, *Miss Joubert* (type in Stockholm).

Flowering Oct. This has affinity with *A. Joubertiana* Schldl. and *A. sedifolia* Schldl., from the same locality, and it may be a form of those species.

114. **A. geniculata** sp. nov.; ramulis pubescentibus; foliis alternatis confertis ovatis obtusis, apice incurvis, supra paulum concavis glabris, apice versus crassa costatis; floribus terminalibus; pedunculis glabris bracteolatis; sepalis ovatis vel obovatis, supra concavis, margine hyalinis ciliatis; petalis obovatis, infra medium anguste unguicularibus ciliatis; staminibus infra medium sparse pubescentibus; staminodis supra medium lineari-lanceolatis sparse ciliatis, medium conspicue geniculatis pilosis, infra medium filiformibus sparse ciliatis; ovario 3-loculari, apice piloso, cornubus obovatis; stylo glabro.

A low rather rigid shrublet with rigidly pubescent branchlets. Leaves 4 mm. long, alternate, erect-spreading, very crowded, ovate, obtuse, rounded at the base, incurved at the apex, slightly concave above, with

a raised nerve beneath much swollen in the upper half, with inconspicuous glands on the margin, nerve and sometimes elsewhere beneath, tipped with rigid hairs. Flowers in dense terminal clusters. Peduncles 1 mm. long, glabrous, with linear-oblong ciliate bracteoles at or near the base. Sepals 2.5—3 mm. long, ovate or obovate, rather abruptly narrowing to an obtuse apex, concave above, navicular at the apex, hyaline and ciliate at the margins. Petals 5 mm. long; blade obovate, very obtuse, glabrous; claw $1\frac{1}{2}$ times as long, linear, ciliate. Stamens very sparsely pubescent on the lower half. Staminodes 4 mm. long, linear-lanceolate and sparsely pilose-ciliate in the upper half, distinctly geniculate and densely pilose at the middle, filiform and sparsely ciliate in the lower half. Disk well developed, crenulate. Ovary rigidly pilose on the apex, with 3 carpels bearing obovate processes furrowed and rigidly pilose on the inner face. Style glabrous.

BREDASDORP DIV.: a mile east of Agulhas, *Salter* 4137 (type, in Bolus Herb.).—CALEDON DIV.: Gansbaai, *Walgate* in Bolus Herb. 24438.

Flowering Dec. The affinity is with *A. serpyllacea* Licht., particularly with the forms having similar leaves; but the bracteoles are basal, the staminodes have a distinct knee at the middle, and the processes on the carpels are obovate.

115. *A. imbricata* Willd. *Enum. Hort. Berol.* 259 (1809); *Link, Enum. Hort. Berol.* i, 238 (1821); *Bartl. and Wendl. Diosm.* 144 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 418 (1860); *Engl. in Engl. and Prantl. Pflanzenfam.* iii, §4, p. 151 (1896); *Dümmer in Fed. Rep.* xi, 404 (1912); *Walgate in Fl. Cape Peninsula* 540 (1950). *Hartogia ciliata* Berg. *Pl. Cap.* 68 (1767) excl. syn. omn. *H. imbricata* Linn. *Mant.* 124 (1767). *Diosma imbricata* Linn. *Syst. Veg.* ed. 14, p. 239 (1784); *Lam. Encycl. Meth.* ii, 287 (1786); *Ait. Hort. Kew.* ed. 1, i, 275 (1789); *Thunb. Prodr.* 43 (1794); *ej. Diss. Diosm.* 5 (1797); *Murr. Syst. Veg.* 250 (1797); *Willd. Sp. Pl.* i, 1137 (1798); *Pers. Syn. Pl.* i, 247 (1805); *Ait. Hort. Kew.* ed. 2, ii, 31 (1811); *DC. Prodr.* i, 715 (1824); *Spreng. Syst. Veg.* i, 787 (1825). *Bucco imbricata* Wendl. *Collect.* i, 33, t. 9 (1805); *Roem. and Schultes, Syst. Veg.* v, 439 (1819). *B. acuminata* Wendl. *Collect.* i, t. 28; *Roem. and Schultes, Syst. Veg.* v, 440. *Agathosma acuminata* Willd. *Enum. Hort. Berol.* 260 (1809); *Bartl. and Wendl. Diosm.* 147, excl. syn. *Pluk. Bucco obtusata* Wendl. *Collect.* iii, 7, t. 76 (1819); *Roem. and Schultes, Syst. Veg.* v, 444 (1819). *B. vestita* Roem. and Schultes *op. cit.* 447. *Diosma lycopodioides* Willd. *ex Roem. and Schultes op. cit.* 461. *Agathosma lycopodioides* Bartl. and Wendl. *Diosm.* 148 (1824); *Sond. op. cit.* 418; *Dümmer in Fed. Rep.* xi, 404, incl. var. *trichostyla*. *A. obtusata* G. Don, *Gen. Syst.* i, 789 (1831). *A. polyphylla* Presl, *Bot. Bemerk.* 32 (1844) absque descr. *Har-*

togia lycopodioides O. Kze. *Rev. Gen.* i, 101 (1891). **Agathosma Lambii** Dümmer *op. cit.* 405! **A. pseudoimbricata** Dümmer *op. cit.* 406! **A. gracilipetala** Dümmer in *Ann. Bolus. Herb.* iii, 60 (1920)!

A low usually much branched shrub. Branchlets glabrous, \pm pubescent or pilose. Leaves 2.5—5 mm. long, alternate, ascending, erect-spreading or spreading, often subimbricate, sometimes imbricate, linear-lanceolate, lanceolate, ovate-lanceolate ovate or subrotund, acute or subacute, sometimes acuminate, rounded or subcordate at the base, \pm concave and glabrous above, ciliate and \pm keeled, at least on the upper half, \pm pubescent or glabrous beneath. Flowers in terminal clusters, the lower sometimes axillary. Peduncles 2—4 mm. long, glabrous, sparsely pilose or pubescent, with bracteoles on the lower half. Sepals 2—2.5 mm. long, ovate-lanceolate, oblong, ovate-oblong, elliptic or ovate, subacute or obtuse, sometimes membranous at the margin, ciliate, convex and glabrous, puberulous or pubescent beneath, keeled behind the apex. Petals 4—7.5 mm. long; blade rotund, widely ovate or widely obovate; claw 2—2½ times as long, subfiliform, pilose-ciliate on the lower half. Stamens sparsely ciliate near the base. Staminodes 3—4.5 mm. long, spatulate or oblong, very obtuse, tapering to a slender base, pilose-ciliate on the upper half, usually with a gland behind the apex. Ovary glandular and pilose on the upper half, with 3 carpels bearing oblong pilose processes. Style glabrous, or sparsely pilose on the lower half.

South Africa: without precise locality, *Drège* 7127, *Sieber* 192, *Thom* 804, *Schlechter* 9922 partly (type of *A. pseudoimbricata* in Kew Herb.).—BREDASDORP DIV.: limestone near Struis Bay, *Esterhuysen* 7622, *Hafstrom* and *Acocks* 2173; margin of salt pan north-west of The Poort, *Acocks* 1759; Frikkie's Bay, *Compton* 18189; Elim, *Bolus* 6781, 6782, *Compton* 9089, 19024; "Blauwfontein," *Smith* 4998; between Baard-scheerbosch and Elim, *Esterhuysen* 2580; between Bredasdorp and Elim, *Esterhuysen* 3100; The Poort, *Compton* 2481, *Walgate* in *Bolus* Herb. 23960.—CALEDON DIV.: hills near Caledon, *Bolus* 9152 (type of *A. gracilipetala* in *Bolus* Herb., cotype in Albany Mus.); Zondags Kloof, *Walgate* 83; near Stanford, *Stokoe* in *Bolus* Herb. 23969; Klein River Mts., *Stokoe* 8306; Hermanus, *Barker* 1720, *Bolus* 9864, *Galpin* 3873; Rooi Els, *Esterhuysen* 14123; Palmiet River, *Schlechter* 5426, *Stokoe* 8274; Hawston, *Schlechter* 9479; Houwhoek, *Schlechter* 9407, 9407a; Aries Kraal, *Compton* 16467; "Highlands," *Compton* 12251; Kleinmond, *Compton* 12376; near Palmiet River Mouth, *Compton* 14130, *Gillett* 4218, *Stokoe* 9152.—CAPE DIV.: vicinity of Cape Town, *Burchell* 444; Table Mt., *Bolus* 13390, *Burchell* 611; Bishopscourt, *Compton* 10034; between Cape Town and Stellenbosch, *Burchell* 8369; Cape Flats, *Ecklon* and

Zeyher 298, 870; flats east of Claremont, *Dümmer* 826; flats near the Blaauwberg, *Ecklon* 242, *Zeyher* 299; "Kirstenbosch," *Adamson* in S. Afr. Mus. Herb. 39022, *Compton* 7666; flats near Wynberg, *Bolus* 2742; above Camp's Bay, *Galpin* 3876; Devil's Peak, *Rehmann* 1157; Constantia Nek, *Wall* 1698/10; between "Kirstenbosch" and Constantia Nek, mountain top, *Esterhuysen* 1293; Wynberg Hill, *Pillans* 8978; "Cecilia," *Compton* 18667; summit of the Muizenberg, *MacOwan* in Herb. Norm. Austr.-Afr. 206; Fish Hoek, *Page* in *Bolus* Herb. 23962; Simonsberg, *W. Dod* 750; Menskop, *Walgate* 6; Rooihoogete, *Walgate* 7; Vlakkeberg, *Walgate* 65; Swartkop, *Esterhuysen* 12986, *Walgate* 8, 16; Silvermine Valley, *Compton* 16631, *Esterhuysen* 1766, 1779; Witsand, *Penfold* 266, *Salter* 6388; Faroe Kop, *Walgate* in *Bolus* Herb. 23959; Hout Bay, *Pillans* 8977; Clovelly, *Walgate* 13; Constantiaberg, *Compton* 8228, Noordhoek, *Wasserfall* 665; plateau west of Simonstown, *Compton* 19419; near Simonstown, *MacGillivray* 624; summit of Pauls Berg, *Pillans* 8976; Cape Point, *Walgate* 14; Smitswinkel, *Compton* 5988, 8711.—MALMESBURY DIV.: dunes near Saldanha Bay, *Drège*, *Foley* in Natal Herb. 20140; near Bok Point, *Compton* 9419; Mamre Road, *Barker* 1083; near Mamre, *Bolus* 4261, *Walgate* 11; Geelbek, *Pole Evans* 4424; Constable Hill, *MacNae* 1074; between Bokbaai and Darling, *Compton* 21223, *Esterhuysen* 3831; Langebaan, rock-crevices, *Pillans* 6697; "Klipfontein," *Zeyher* in S. Afr. Mus. Herb. 14477.—MOSSEL BAY DIV.: Mossel Bay, *Moran* in *Bolus* Herb. 23963; between Mossel Bay and Sandrivier, *Burchell* 6320 (type of *A. Lambii* in Kew Herb.).—STELLENBOSCH DIV.: Gordon's Bay, *Bolus* 8082; Brackenfel, *Bond* 720, *Esterhuysen* 4059.—TULBAGH DIV.: mountain slopes near Tulbagh, *Ecklon and Zeyher* 869; Winterhoek Mt., *Ecklon and Zeyher* 871, *Drège* 7095.

Flowering Aug.—Febr. The great variation in the shape of the leaves is a remarkable feature of this species. The variations with characters most diverse from those of the typical form occur in the coastal areas where the soil is alkaline.

116. ***A. juniperifolia*** *Barthl. in Linnaea* xvii, 376 (1843)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 428 (1860). ***Hartogia juniperifolia*** *O. Kze. Rev. Gen.* i, 101 (1891). ***Agathosma alta*** *Phillips in Ann. S. Afr. Mus.* ix, 340 (1917)! ***A. Dummeri*** *Phillips op. cit.* 341!

A comparatively tall shrub up to 2.4 m. high, with puberulous pubescent or rarely glabrous branchlets. Leaves 0.6—1 cm. long, alternate, erect-spreading, linear-lanceolate or lanceolate-linear, subacute, rounded at the base, concave or rarely almost flat above, slightly convex and usually nerve-keeled beneath, with glands mostly in rows at the margin and near the nerve, often pilose on the margin nerve and

apex. Flowers in terminal clusters. Peduncles 4—6 mm. long, glabrous or pubescent or with small stalked glands, with slender bracteoles on the lower half. Sepals 1—1.5 mm. long, ovate or subrotund, sometimes shortly tapered, obtuse, obtusely keeled, glabrous, rarely ciliate, or with stalked glands on the upper margin. Petals 3.5—6 mm. long; blade obovate or elliptic-oblong, very obtuse, with a gland behind the apex; claw $\frac{1}{2}$ as long, linear, ciliolate or glabrous. Stamens glabrous. Staminodes 2—6.5 mm. long, linear in the upper half, obtuse, sometimes widened at the apex, with a gland behind the apex, tapering in the lower half, ciliate on the lower half or almost to the apex. Ovary with 2 carpels bearing oblong processes sometimes with long hairs on the apex. Style glabrous.

South Africa: without precise locality, *Guenzius* (cotype of *A. juniperifolia* in Stockholm).—CALEDON DIV.: hills near Bot River, *Bolus* 5465; mountains near Rivier Zonder Einde, *Stokoe* 8290, *A. Wilman* 517; Hottentots Holland Mts., north of Sir Lowry's Pass, *Hutchinson* 357.—CERES DIV.: Mostertsberg, *Schlechter* 396 (possibly a doubtful record).—CLANWILLIAM DIV.: Cederberg, Sneeuwberg, Duivelsgat, *Esterhuysen* 13138.—PAARL DIV.: French Hoek, above Kriel's Farm, *Phillips* 1084 (type of *A. Dümmeri* in S. Afr. Mus. Herb.; French Hoek, *Bolus* in Guthrie Herb. 4024, 4025, *Phillips* 1083 (type of *A. alta* in S. Afr. Mus. Herb.); French Hoek Forest Reserve, *Compton* 5782, 5783, 13868, *Isaac* in *Bolus* Herb. 23986, *Walgate* in *Bolus* Herb. 23985, *Esterhuysen* 7913, *Salter* 6996, 6999; Banhoek, *Esterhuysen* 1778; Wemmershoek, *Esterhuysen* 4036.—STELLENBOSCH DIV.: Jonker's Hoek, *Garside* 193, *Pillans* in *Bolus* Herb. 18724; Diepgat Kloof, *Esterhuysen* 16731; west base of Moordenaars Kop, *Esterhuysen* 17383.

Flowering June—Dec. A form in the Caledon Division approaches nearly to a form of *A. imbricata* but can be distinguished by the proportionately shorter claws of the petals.

117. *A. alaris* Cham. in *Linnaea* v, 53 (1830)!; *Sond. in Harv. and Sond. Fl. Cap.* i, 404 (1860). *Hartogia alaris* O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets sparsely puberulous, somewhat resinous. Leaves 4—7 mm. long, alternate, ascending, subimbricate, lanceolate or ovate, obtuse, rounded or subcordate at the base, slightly concave and minutely tuberculate-scabrid above, convex and with a distinctly raised nerve beneath, tuberculate-scabrid and with small glandular hairs, at first slightly resinous. Flowers in terminal clusters. Peduncles 1.5 mm. long, scabrid, slightly resinous, with linear bracteoles on the lower half. Sepals 1.5 mm. long, ovate or elliptic-oblong, villous-ciliate, convex and slightly scabrid beneath. Petals 4 mm. long; blade obovate or oblong-obovate;

claw $\frac{2}{3}$ as long, linear, ciliate. Stamens with filaments sparsely pubescent on the lower half. Staminodes 1.5 mm. long, linear, tapering in the lower half, densely villous on the upper half, with a large apical gland. Ovary tubercled on the apex, with 3 carpels bearing rounded processes. Style glabrous.

KNYSNA DIV.: Plettenberg Bay, *Mund and Maire* (cotype in Riks. Mus., Stockholm).

A distinct species remarkable for the resinous surface of the young branchlets and leaves.

118. **A. asperifolia** *Eckl. and Zeyher, Enum.* 111 (1835)!; *Bartling in Linnaea* xvii, 379 (1843); *Sond. in Harv. and Sond. Fl. Cap.* i, 463 (1860) *Dümmer in Fed. Rep.* xi, 422 (1912). **Hartogia asperifolia** *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets pubescent or pilose. Leaves 3—6 mm. long, alternate, erect-spreading, lanceolate, obtuse, somewhat cordate or rounded at the base, concave above, glandular and bluntly keeled beneath, with bristle-tipped tubercles above and beneath. Flowers in terminal clusters. Peduncles 1—1.5 mm. long, hispid, with bracteoles on the upper half. Sepals 2 mm. long, lanceolate-ovate, obtuse, ciliate, bluntly keeled and hispidulous beneath. Petals 3.5—4.5 mm. long, glabrous, with a rotund or obovate gland-tipped blade and a slender claw $2\frac{1}{2}$ —3 times as long. Stamens glabrous. Staminodes 2.5 mm. long, linear obtuse in the upper half, tapering to a slender base, villous on the lower half, tipped with a large gland. Ovary with 3 carpels bearing oblong pilose processes. Style for the most part pilose.

CLANWILLIAM DIV.: Elands Kloof, *Esterhuysen* 3128, 3963, *Bond* 712; Warm Baths, *Compton* 5366, *Stephens and Glover* in *Sladen Mem. Exped.* 7736; Uitkyk Pass, *Compton* 5334; Zuurvleiberg, *Esterhuysen* 2549; Schimmelberg, *Pillans* 9091.—PIKETBERG DIV.: between Nieuwekloof and Elands Kloof, "Bergplaas," *Drège* 7112; west entrance to Grey's Pass, *Gillett* 3739.—TULBAGH DIV.: near Tulbagh Waterfall, *Ecklon and Zeyher* 872 (cotypes in Bolus Herb., Kew, Lund, National Herb., S. Afr. Mus. Herb., Stockholm); Ontongsborg, *Isaac* in Bolus Herb. 23976; Tulbagh Waterfall, *Compton* 12436.

Flowering Sept.—March.

119. **A. salina** *Eckl. and Zeyher, Enum.* 111 (1835)! *absque descr.*

Branchlets pubescent. Leaves 2.5—3.5 mm. long, alternate, erect-spreading, crowded, oblong-lanceolate, obtuse, rounded at the base, concave and shortly pilose above, rounded, with large glands and hair-tipped tubercles beneath. Flowers in terminal clusters. Peduncles 0.5

mm. long, scabridous, with filiform bracteoles at the apex, subtended by spatulate membranous ciliate bracts. Sepals 1.75—2 mm. long, oblanceolate-linear, obtuse, flat, thin, ciliate. Petals 3.5—4 mm. long; blade oblanceolate, obtuse; claw as long, linear, ciliate. Stamens glabrous. Staminodes 2.5 mm. long, linear, widened and ciliate at the middle, tapering towards both ends. Ovary glabrous, with 3 carpels rounded above, without processes. Style glabrous.

CLANWILLIAM DIV.: stony places near Brakfontein, *Ecklon and Zeyher* 873 (cotypes in S. Afr. Mus. and Stockholm).

Flowering August. Sonder included a portion of Ecklon and Zeyher's 873 under *A. asperifolia* but did not mention Brakfontein as a locality, yet he had material in his herbarium labelled as coming from there.

120. *A. leptospermoides* Sond. in *Harv. and Sond. Fl. Cap.* i, 405, (1860)!; *Engl. in Engl. and Prantl, Pflanzenfam.* iii, §4, p. 150 (1896). *A. apiculata* E. Mey. in *Drège, Zwei Pfl. Doc.* 115 (1844) absque descr. *Hartogia leptospermoides* O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets pubescent. Leaves 7 mm. long, alternate, erect-spreading, ovate, acute or obtuse, rounded or subcordate at the base, concave and scabridous above, navicular at the apex, spreading at the margin, gibbous behind the apex, conspicuously nerve-keeled and scabridous beneath, villous on the margin and on the keel. Flowers in terminal clusters situated laterally or at the forking of the stems. Peduncles tomentose, subtended by oblong ciliate bracteoles. Sepals 1.75 mm. long, ovate-oblong, obtuse, navicular, membranous at the margin, ciliate, \pm puberulous above and beneath, rounded and with many impressed glands beneath. Petals 4.5 mm. long; blade elliptic or obovate, obtuse, villous above on the nerve; claw as long or slightly longer, narrowly linear, villous-ciliate. Stamens with villous filaments. Staminodes 4—4.75 mm. long, narrowly linear, acuminate, tipped with a small gland, villous on the middle part. Disk conspicuous, toothed at the margin. Ovary villous on the apex, with 3 carpels bearing rotund pilose processes.

CALEDON DIV.: mountains north of Genadendal, *Burchell* 7859, *Drège* (type, in Stockholm, cotype in S. Afr. Mus. Herb.).—ROBERTSON DIV.: Poesjenets River, *Levy's* 5479.

Flowering Febr., April and Oct. This and *A. roodebergensis* are the two species characterized by the inflorescences being lateral and at the forking of the stems.

121. *A. roodebergensis* *Compton in Journ. Bot.* lxx, 284 (1932)!

A laxly branched shrub about 70 cm. high, with glandulose and puberulous branchlets. Leaves 3—4 mm. long, alternate, erect-spreading,

ovate or lanceolate-ovate, obtuse, somewhat incurved, slightly concave and minutely papillate-scabrid above, convex and papillate-scabrid beneath, obtusely keeled in the upper half, with many scattered glands. Flowers in clusters at the forking of the stems, or in lateral, rarely terminal, clusters. Peduncles 3—3.5 mm. long, glandulose and puberulous, with filiform bracteoles at the middle. Sepals 1—1.5 mm. long, oblong or ovate-oblong, obtuse, densely ciliate, obtusely keeled, glandulose and puberulous, with filiform bracteoles at the middle. Sepals 1—1.5 mm. long, oblong or ovate-oblong, obtuse, densely ciliate, obtusely keeled, glandulose and puberulous. Petals 5 mm. long; blade oblong-obovate, very obtuse, glabrous; claw almost as long, linear, ciliate. Stamens with very sparsely pilose filaments. Staminodes 3 mm. long, linear-lanceolate, tipped with a conspicuous gland, tapering to a very slender base, pilose above and beneath at the middle, ciliate upwards. Disk with the margin incurved upon the ovary. Ovary glabrous, with 3 carpels bearing rotund processes. Style glabrous.

LADISMITH DIV.: Roodeberg, *Compton* 3851 (type, in Bolus Herb., cotype in Kew Herb.); Gamka Pass, *Esterhuysen* 17128.

Flowering May—Nov. The affinity of this species is with *A. leptospermoides*, but it differs in the presence of bracteoles on the peduncles.

122. **A. gnidiiflora** *Dümmmer in Fed. Rep.* xi, 415 (1912)!

Branchlets pubescent. Leaves 4—6 mm. long, alternate, crowded, ascending, slightly incurved, lanceolate-linear, obtuse or subacute, rounded or somewhat cuneate at the base, deeply concave, smooth and glabrous above, with a prominent keel, gland-scaberulous and strigose beneath. Flowers in terminal clusters. Peduncles 4—5 mm. long, sometimes sparsely pilose, with minute stalked glands, with bracteoles on the lower half. Sepals 2.5 mm. long, lanceolate, subacute, amply ciliate, keeled and gland-scaberulous beneath. Petals 4.5 mm. long; blade widely ovate, very obtuse, concave in the upper half; claw twice as long, slender, sparsely pilose-ciliate. Stamens with sparsely pubescent filaments. Staminodes 4 mm. long, narrowly linear, acute, tipped with a large rotund gland, long-tapering towards the base, pilose except at the base and apex. Ovary densely pilose, with 3 carpels bearing rotund pilose processes. Style densely pilose.

RIVERSDALE DIV.: near Zoutemelks River, in a walk to the clay pit, *Burchell* 6670 (type in Kew Herb.).

Flowering Nov.

123. **A. krakadouwensis**, *Dümmmer in Ann. Bolus Herb.* iii, 47 (1920)!

Branchlets villous. Leaves 6—9 mm. long, alternate, erect-spreading

or suberect, lanceolate-linear, obtuse, rounded at the base, concave and pubescent above, with closely involute margins, rounded and at first pubescent beneath, tuberculate-scabrid and with many raised glands beneath. Flowers in terminal clusters. Peduncles 1—1.5 mm. long, pubescent, with acicular pubescent bracteoles near the apex. Sepals 1.5—2 mm. long, oblong or oblanceolate-oblong, obtuse, slightly concave and usually sparsely pubescent above, ciliate, rounded and \pm pubescent beneath. Petals 4.5—5 mm. long; blade oblanceolate, often retuse, with a gland behind the apex; claw 2—2½ times as long, very slender, sparsely pilose. Stamens glabrous. Staminodes 3.5—4 mm. long, narrowly spathulate in the upper half, subfiliform and sparsely pilose below. Ovary densely villous, usually with 3, sometimes 2 or 4, carpels bearing oblong or clavate processes. Style mostly pilose.

CLANWILLIAM DIV.: Krakadouw Pass, *Bolus* 8959 (type, in *Bolus* Herb.); between Heuning Vlei and Crystal Pool, *Esterhuysen* 7529; between Heuning Vlei and Koupoort, near water on plateau, *Esterhuysen* 12126.

Flowering Oct.—Dec.

124. *A. bicolor*, *Dümmer* in *Ann. Bolus Herb.* iii, 61 (1920)!

Branchlets \pm silky-pilose. Leaves 0.5—1 cm. long, alternate, erect-spreading, lanceolate or linear-lanceolate, obtuse or subacute, rounded at the base, concave and glabrous or silky-villous above, keeled and glabrous or villous beneath, usually long-ciliate, rough with minute tubercles above and beneath. Flowers in terminal clusters. Peduncles 0.75 mm. long, sparsely puberulous, with linear ciliate bracteoles on the lower half. Sepals 1.5 mm. long, oblong, obtuse, rounded-convex beneath, ciliate, often sparsely pubescent above. Petals 5 mm. long; blade obovate, with a gland behind the apex; claw almost or quite 2½ times as long, very slender, sparsely pilose below the middle. Stamens glabrous. Staminodes 3.5 mm. long, narrowly linear in the upper half, filiform and pilose below. Ovary densely villous, with 3 or sometimes 2 carpels bearing elliptic-rotund processes. Style pilose on the lower half.

CLANWILLIAM DIV.: Pakhuis Pass, *Schlechter* 10803 (type, in *Bolus* Herb., cotypes in Albany Mus. and National Herb.), *Esterhuysen* 3133, 7407, 22932, *Bond* 584.

Flowering Aug.—Sept.

125. *A. longicornu* sp. nov.; ramulis pilosis; foliis alternatis ovato- vel oblongo-lanceolatis obtusis ciliatis, supra valde concavis glabris, subtus valde carinatis; floribus terminalibus; pedunculis glabris vel sparse pubescentibus bracteolatis; sepalis lineari-lanceolatis subacutis ciliatis

navicularibus; petalis obovatis glabris anguste unguiculatis; staminibus glabris; staminodis lineari-oblongis, infra medium angustissimis pilosis; ovario 2-loculari glabro cornubus oblongis; stylo piloso.

Branchlets pilose. Leaves 4—6 mm. long, alternate, erect-spreading, ovate- or oblong-lanceolate, obtuse, rounded at the base, deeply concave above, slightly recurved and densely long-ciliate at the margin, with a prominent long-ciliate keel, with small scattered glands beneath. Flowers in terminal clusters. Peduncles 0.1—3 mm. long, glabrous or very sparsely pubescent, with slender ciliolate bracteoles on the lower or upper half. Sepals 1.75 mm. long, linear-lanceolate, subacute, navicular, pilose-ciliate. Petals 4.5—5 mm. long; blade obovate; claw 3 times as long, very slender, sparsely ciliate. Stamens glabrous. Stamínodes 3.5—4 mm. long, with a linear-oblong blade and very slender pilose claw. Disk crenulate. Ovary glabrous, with 2 carpels bearing oblong obtuse processes. Style pilose except near the apex. Fruit laterally compressed, pubescent on the apex, with processes 3 mm. long.

CERES DIV.: Southern Cederberg, Gideon's Kop, *Esterhuysen* 13899.—CLANWILLIAM DIV.: Driehoek Valley, *Esterhuysen* 8117 (type, in Bolus Herb.).

Flowering Sept. The nearest affinity is doubtful. The name alludes to the comparatively long processes on the fruit.

126. **A. cephalodes**, *E. Mey. b. ex Sond. in Harv. & Sond. Fl. Cap.* i, 406 (1860!); *Dümmer in Fed. Rep.* xi, 324 (1912). **A. globuliflora** *Presl, Bot. Bemerk.* 31 (1844)! nomen. **Hartogia cephalotes**, *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets with coarse hairs. Leaves 0.6—1 cm. long, alternate, erect-spreading or ascending, lanceolate-ovate or ovate, subacute, rounded or subcordate at the base, slightly incurved at the apex, concave and glabrous above, ciliate, convex, tubercled and coarsely pubescent beneath, gibbous behind the apex. Flowers in terminal clusters surrounded by spatulate scarious leaves. Peduncles 1—2 mm. long, sparsely hispid, with linear-filiform bracteoles on the lower half. Sepals 5 mm. long, linear, obtuse, slightly widened and conspicuously ciliate on the upper half. Petals 7 mm. long; blade about 2 mm. long, obovate, glabrous, tapering into a widely linear ciliate claw. Stamens glabrous. Stamínodes 5.5 mm. long, oblanceolate, concave and conspicuously ciliate on the upper half, linear towards the apex, attenuate and glabrous in the lower half. Ovary pilose on the apex, with 3 carpels bearing oblong densely pilose processes. Style pilose at the base.

CLANWILLIAM DIV.: between Bergvlei and Langvlei, "Zwartbast Kraal," *Drège* (cotypes in Kew Herb. and National Herb.).

Flowering Sept.—Nov. This is obviously very closely related to *A. involucrata*, Eckl. and Zeyher.

127. **A. involucrata**, Eckl. and Zeyher, *Enum.* 109 (1835) !; *Barl. in Linnaea* xvii, 380 (1843); *Sond. in Harv. and Sond. Fl. Cap.* i, 405 (1860). [**A. cephalodes** a E. Mey. in Drège's Herb.] **Hartogia involucrata**, O. Kze. *Rev. Gen.* i, 101 (1891).

Branchlets coarsely pubescent. Leaves 4—6 mm. long, alternate ascending or erect-spreading, oblong-lanceolate or ovate-oblong, very obtuse, rounded at the base, concave and smooth and glabrous above, distinctly thickened and involute at the margin, rounded, minutely tubercled and pubescent beneath. Flowers in terminal clusters surrounded by rotund, widely obovate or spatulate scarious leaves with membranous margins. Peduncles 2 mm. long, sparsely pubescent, with linear bracteoles on the upper half. Sepals 4 mm. long, linear-oblong, obtuse, narrowing towards the base, ciliate, pilose at the apex. Petals 8 mm. long; blade about 2.5 mm. long, oblanceolate, obtuse, glabrous; claw linear, ciliate on the lower half. Stamens glabrous. Staminodes 7 mm. long, linear-oblanceolate and pilose-ciliate at the middle, linear and glabrous upwards, tapering to an obtuse apex and to a slender glabrous base. Ovary hispid on the apex, with 3 carpels bearing small rounded processes. Style glabrous.

CLANWILLIAM DIV.: sandy places at Bergvlei, *Ecklon and Zeyher* 858 (cotypes in Albany Mus., Kew Herb., Stockholm and S. Afr. Mus. Herb.), *Niven* 23; between Bergvlei and Langvlei, "Zwartbastkraal," *Drège*.

Flowering Sept., Oct.

128. **A. sabulosa**, *Sond. in Harv. and Sond. Fl. Cap.* i, 406 (1860) !; *Dümmer in Fed. Rep.* xi, 324 (1912). **Hartogia sabulosa**, O. Kze. *Rev. Gen.* i, 102 (1891).

Branchlets puberulous. Leaves 0.5—1 cm. long, alternate, crowded, erect-spreading, lanceolate, obtuse, rounded at the base, concave, slightly scabrid and puberulous above, thickened at the margin, often slightly incurved at the apex, obtusely convex, somewhat nerve-keeled, minutely tubercled, puberulous and with large impressed glands scattered beneath. Flowers in terminal involucred clusters. Involucral leaves 3—4.5 mm. long, oblong-elliptic or obovate-elliptic, obtuse, scarious, scabrid, ciliate. Peduncles 2.5—3 mm. long, puberulous, with lanceolate ciliate bracteoles at the middle. Sepals 3 mm. long, lanceolate, obtuse, rounded and puberulous beneath. Petals 5 mm. long; blade ovate, obtuse, glabrous; claw $1\frac{1}{2}$ times as long, linear, sparsely ciliate on the lower half. Stamens glabrous. Staminodes 4 mm. long, linear, slightly widened at the very obtuse apex,

tapering towards the base, ciliate at the middle, with a conspicuous gland behind the apex. Ovary glabrous, with 3 carpels bearing short ovate processes. Style glabrous.

CLANWILLIAM DIV.: Jakhals Vlei, sandy flats, *Nivea* (type in Stockholm).

Flowering Sept., Oct. This species is retained with some doubt. It is very closely related to *A. involucrata*. The material is scanty.

129. **A. affinis**, *Sond. in Harv. and Sond. Fl. Cap.* i, 405 (1860)! **Hartogia affinis**, *O. Kze. Rev. Gen.* i, 101 (1891).

Branchlets pubescent. Leaves 4—7 mm. long, alternate, ascending, subimbricate, lanceolate or ovate-lanceolate, obtuse, rounded or subcuneate at the base, slightly incurved in the upper half, concave and \pm tuberculate-scabrid above, pilose-ciliate on the upper half, rounded and slightly keeled, tuberculate-scabrid and puberulous beneath. Flowers terminal and in the axils of the uppermost leaves. Peduncles 1 mm. long, puberulous, with bracteoles at the middle. Sepals 1.75—2 mm. long, ovate-lanceolate, obtuse, densely ciliate, tuberculate-scabrid and with short glandular hairs beneath, with a prominent keel decurrent on the calyx-tube. Petals 5 mm. long; blade narrowly obovate; claw almost as long, slender, ciliate. Stamens glabrous. Staminodes 4 mm. long, linear-oblong and villous at the middle, tapering to a slender apex bearing a large gland, slender and ciliate below the middle. Ovary glabrous, with 3 carpels bearing rotund processes. Style glabrous.

PRINCE ALBERT DIV.: Zwartberg, Vrolyk, in wet situations on the mountains, *Drège* 7113 (type, in Riks Mus., Stockholm).

Flowering Aug. This closely resembles *A. hirta* Bartl. and Wendl. of which it may be an inland form.

130. **A. hirta**, *Bartl. and Wendl. Diosm.* 188 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 404 (1860); *Engl. in Engl. and Prantl., Pflanzenfam.* iii, §4, p. 150 (1896); *Dümmer in Fed. Rep.* xi, 323 (1912). **Diosma hirta**, *Lam. Encycl. Meth.* ii, 286 (1786); *ej. Tabl. Encycl.* ii, 81 (1797). **Bucco hirta**, *Roem. and Schultes, Syst. Veg.* v, 446 (1819). **A. biophylla**, *Eckl. and Zeyher, Enum.* 110 (1835)! *Bartl. in Linnaea* xvii, 373 (1843). **A. adeno-caulis**, *Eckl. and Zeyher, Enum.* 115! **Hartogia adenocaulis**, *O. Kze. Rev. Gen.* i, 101 (1891). **Agathosma hirtoides**, *Dümmer in Fed. Rep.* xi, 323 (1912)!

Branchlets puberulous or pubescent, with prominent leaf-bases. Leaves 0.4—1.5 cm. long, alternate, ascending or erect-spreading, lanceolate or ovate-lanceolate, obtuse, acute or acuminate, rounded or subcuneate at the base, concave above, usually pilose-ciliate, rounded

and often keeled beneath on the upper half, with scattered glands and \pm pubescent or pilose beneath, or entirely glabrous, sometimes tuberculate-scabrid. Flowers in terminal clusters and in the axils of the uppermost reduced leaves. Peduncles 2—4 mm. long, glabrous or sparsely pilose, with bracteoles at or shortly below the middle. Sepals 1.5—2 mm. long, ovate- or oblong-lanceolate, obtuse, pilose-ciliate, convex beneath, conspicuously keeled down to the peduncle, sometimes scabrid and with short glandular hairs. Petals 4.5—5 mm. long; blade obovate or elliptic, obtuse, concave above, sometimes almost cucullate at the apex; claw $\frac{2}{3}$ or almost as long, linear or subfiliform, ciliate. Stamens glabrous. Staminodes 3.5—5 mm. long, linear, linear-oblong or oblong-lanceolate, obtuse, with a gland behind the apex, tapering to a slender base, villous at the middle, ciliate below. Ovary setose on the apex, or glabrous, with 3 carpels bearing obovate or rotund processes. Style glabrous.

HUMANSDORF DIV.: Slang River, *Fourcade* 1846; Company's Drift, *Fourcade* 2868; Loerie Plantation, *Dix* 149; Klipdrift, *Thode* A2469, A2470; Karreedouw, *Compton* 4559.—PORT ELIZABETH DIV.: Witte Klip, *Bolus* 9113, *Long* 654; between Krakamma and upper part of Leadmine (Maitland) River, *Burchell* 4587; hills near Krakamma, *Ecklon and Zeyher* 902 (cotype of *A. adenocaulis* in Stockholm); 7 miles west of Port Elizabeth, *Walgate* in *Bolus* Herb. 23941; between Port Elizabeth and Van Staadens, *Barker* 513; near Port Elizabeth, *Zeyher* 2164; Walmer, *Paterson*, 481a, *Kemsley* 222; Hofman's Bosch, *Britten* 1096.—UITENHAGE DIV.: Uitenhage, *Ecklon* 689 (type of *A. hirtoides* in Kew Herb.); flats at the base of Van Staadensberg, *Zeyher* 2166, *Ecklon and Zeyher* 861 (cotypes of *A. biophylla* in Kew Herb., National Herb., Stockholm and S. Afr. Mus. Herb.), *Bolus* 1603, *MacOwan* 1035, 1067, *Paterson* 481; Bethelsdorp, *Paterson* 2651; between Van Staadens and Bethelsdorp, *Drege* 7096; Redhouse, *Paterson* 481.

Flowering Jan.—Dec.

131. *A. dentata* sp. nov.; ramulis dense pubescentibus; foliis alternatis cordatis vel orbicularibus hispidulis, supra paulum concavis, margine convexis; floribus terminalibus; pedunculis puberulis, basin bracteolatis; sepalis obovatis obtusissimis, subtus pubescentibus; petalis obovatis glabris, infra medium unguiculatis; staminibus glabris; staminodis linearibus sparse pilosis, apice recurvis; ovario uniloculari ecornuto, apice pilis clavatis; stylo infra medium sparse piloso.

Wiry shrublet about 30 cm. high, with densely pubescent branchlets. Leaves 2—2.5 mm. long, alternate, erect-spreading, slightly recurved, cordate or orbicular and cordate at the base, slightly concave above, convex at the margin, hispidulous above and beneath, with gland-tipped

hairs on the margin, with scattered glands beneath and near the margin. Flowers several to many together in terminal clusters. Peduncles 0.5 mm. long, puberulous, with oblong obtuse and pubescent bracteoles at the base. Sepals 1.5 mm. long, obovate, very obtuse, usually glabrous above, slightly concave beneath, pubescent, with a gland behind the apex. Petals 4—4.5 mm. long, glabrous; blade obovate, very obtuse, tapering to a linear claw $\frac{1}{3}$ as long. Stamens glabrous. Staminodes 3—3.5 mm. long, linear, tapering to the base and to the recurved apex, very sparsely pilose about the middle. Disk well developed, distinctly toothed. Ovary consisting of one obovate carpel with clavate hairs on the upper half, without processes. Style very sparsely pilose on the lower half.

CLANWILLIAM DIV.: Cederberg, Matjesrivier, *Wagener* 106 (type, in National Bot. Gdns., Kirstenbosch, cotype in Bolus Herb.).

Flowering Aug. A very distinct species. The name alludes to the toothing of the disk.

132. **A. kougaense** sp. nov.; ramulis puberulis; foliis alternatis lanceolatis, acutis ciliolatis supra concavis, subtus convexis; floribus axillaribus; pedunculis puberulis ebracteolatis; sepalis ovato-oblongis obtusis ciliatis, margine hyalinis; petalis obovatis subacutis vel acutis ciliolatis, supra sparse pubescentibus, basi cuneatis; staminibus glabris; staminodis linearibus ciliatis, apice glandula notatis; ovario 2-loculari glabro, cornubus rotundatis; stylo glabro.

Branchlets puberulous. Leaves mostly 1 cm. long, alternate, erect-spredding, lanceolate, acute, rounded at the base, concave and somewhat rough above, slightly thickened at the margin, ciliate, rounded and with scattered and marginal glands beneath, with a scarcely raised nerve. Flowers in pairs in the axils of the upper leaves. Peduncles 1.5—2 mm. long, puberulous, subtended by small ovate bracteoles. Sepals 2 mm. long, ovate-oblong, obtuse, hyaline at the margin, ciliate, rounded and with 2 rows of glands beneath. Petals 5 mm. long, obovate, subacute or acute, cuneate at the base, ciliate, slightly concave and sparsely pubescent above, with several glands beneath. Stamens glabrous. Staminodes 1.5 mm. long, linear, tipped with a conical gland, slightly concave above, ciliate. Disk crenulate. Ovary glabrous, with 2 carpels bearing very small rotund processes. Style glabrous.

UNIONDALE DIV.: Kouga Mts., peak east of Smutsberg, *Esterhuysen* 7028 (type, in Bolus Herb.).

Flowering Nov. The affinity is with *A. unicapellata*, from which it is distinguished by leaves concave above, by obtuse sepals and pointed petals, by linear staminodes, 2 carpels and rotund processes.

133. **A. unicarpellata** comb. nov. **Barosma unicarpellata** Fourcade in *Trans. Roy. Soc. S. Afr.* xxi, 99 (1932)!

A much branched shrub about 20 cm. high. Branchlets puberulous except on raised strips at the bases of the leaves. Leaves mostly 6–8 mm. long, alternate, erect-spreading, ovate-lanceolate or lanceolate, acute, cuneate at the base, slightly convex above, slightly revolute and obscurely gland-crenate, glabrous, with a prominent nerve and scattered glands beneath. Flowers 1–3 together in the axils of the upper leaves. Peduncles 0.5–1 mm. long, glabrous, subtended by small rotund ciliolate bracteoles. Sepals 1–1.25 mm. long, widely ovate, acute, ciliate, obtusely convex and shiny beneath. Petals 5 mm. long, obovate, rounded at the apex, narrowly cuneate at the base, slightly concave and pubescent above. Stamens glabrous. Staminodes 1.25–1.5 mm. long, spatulate, obtuse, ciliate, slightly concave above. Disk crenulate. Ovary glabrous, with 1 carpel bearing an oblong obtuse terete process. Style glabrous.

HUMANDSORP DIV.: between Humansdorp and Hankey, *Fourcade* 2235 (type, in Bolus Herb.), 5555, 6077.

Flowering July, Aug.

134. **A. umbonata** sp. nov.; ramulis dense villosis; foliis alternatis lanceolatis apiculatis piloso-ciliatis, supra concavis; floribus axillaribus; pedunculis glabris ebracteatis; sepalis lanceolato-ovatis obtusis ciliolatis; oblongo-oblanceolatis subacutis, supra sparse villosis; staminibus glabris; staminodis oblanceolato-oblongis ciliatis, apice glandula notatis; ovario biloculari apice pubescente eornuto; stylo glabro.

About 60 cm. high. Branchlets densely clothed with long spreading grey hairs. Leaves 1–1.5 cm. long, alternate, erect-spreading, lanceolate, apiculate, rounded at the base, concave above, pilose-ciliate, rounded and with many small scattered glands beneath, often pilose beneath on the nerve. Flowers axillary, solitary. Peduncle 0.5 mm. long, glabrous, subtended by oblong obtuse bracteoles. Sepals 1 mm. long, lanceolate-ovate, obtuse ciliolate, convex beneath. Petals 6 mm. long, oblong-lanceolate, subacute, concave and sparsely villous above, ciliolate on the lower half, with 2 rows of glands beneath. Stamens glabrous, with an apical gland on the connective. Staminodes 1.5 mm. long, oblanceolate-oblong, with a round terminal gland, ciliolate on the upper half. Disk with obtuse teeth, closely enveloping the ovary. Ovary pubescent on the apex, with 2 carpels without evident processes, or sometimes with a minute papilla-like process on the apex of the dorsal angle. Style glabrous. Fruit 1-seeded; coccus elliptic, laterally compressed, hispid on the upper half, surmounted by a prominent widely deltoid hump.

SWELLENDAM DIV.: Lemoenshoek Peak, south side of a long ridge, *Esterhuysen* 10486 (type, in Bolus Herb.).

Flowering Sept. The affinity is with *A. unicarpellata*, from which it is distinguished by villous branchlets and a bicarpellate ovary without distinct processes on the carpels.

IMPERFECTLY KNOWN SPECIES.

- A. ambigua** Sweet, *Hort. Brit.* ed. I, p. 89 (1827).
A. brevifolia, Loudon, *Hort. Brit.* i, 86 (1830); *G. Don. Gen. Syst.* i, 787 (1831).
A. clavata, Hoffmgg. *Verz. Pfl.* 36 (1824).
A. coccinea, Hoffmgg. *Verz. Pfl.* 36 (1824).
A. cordata, Hoffmgg. *Verz. Pfl.* 36 (1824).
A. dioica, Sweet, *op. cit.*, p. 89.
A. juncea, Hoffmgg. *loc. cit.*
A. lasiophylla, *G. Don. op. cit.*, 788.
A. perforata, *G. Don. op. cit.*, 789.
A. prolifera, Bartl. and Wendl. *Diosm.* 185 (1824); *Sond. in Harv. and Sond. Fl. Cap.* i, 431 (1860). **Bucco prolifera**, Wendl. *Collect.* iii, 9, t. 77 (1811); *Roem. and Schultes, Syst. Veg.* v, 445 (1819). **Hartogia prolifera**, *O. Kze. Rev. Gen.* i, 101 (1891).
A. punctata, *G. Don. loc. cit.*
A. reflexa, Link, *Enum. Hort. Berol.* i, 238 (1821).
A. rufescens, *G. Don. loc. cit.*
A. Schlechteriana, Dümmer in *Fed. Rep.* xi, 334 (1912).
A. spicata, Licht. ex *G. Don, Gen. Syst.* i, 788.
A. subcordata, Hoffmgg. *Verz. Pfl.* 36, 163.
A. teretifolia, *G. Don. Gen. Syst.* i, 787.
A. thymifolia, Hoffmgg. *Verz. Pfl.* 36.
Barosma trichopodis, Bartl. and Wendl. ex Juss. in *Mem. Mus. Paris* xii, 474 (1812).

SPECIES EXCLUDED FROM AGATHOSMA.

Agathosma barbata, Spreng. *Pugill.* i, 20 (1813) = **Macrostylis villosa** Sond.

A. spicata, Licht. ex *Roem. and Schultes, Syst. Veg.* v, 448 (1819) sub **Buccone** = **Selago sp.** ?

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